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BY

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AUTHOR OF

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SECOND IMPRESSION

LONDON: T. C. & E. C. JACK

16 HENRIETTA STREET, W.C.

AND EDINBURGH

CONTENTS

CHAPTER I

INTRODUCTORY

It is but recently that psychology has emerged as a distinct science from the chaos which used to be known as metaphysics. And even now there is abundant need for definition and demarcation. Let us then begin by attempting to define psychology; and thereafter we may consider the meaning of various other terms, familiar but vague, and may inquire as to the relations between psychology and certain branches of study which are to be distinguished from it.

Psychology has most frequently been defined as the *science of mind*. But objection has been taken to this definition on the ground that it tends to perpetuate the "disastrous dualism" of mind and matter; and so it has lately been more fashionable to define psychology as the *science of consciousness* or, by some, as the *science of experience*. No one would now venture to define it as the *science of the soul*.

I propose, however, to adhere to the older definition, and regard psychology as the *science of mind*. This, not because any undue importance

is attached to mere names, but because I conceive that the definition of psychology as the science of consciousness is inadequate and partial, notwithstanding the fact that we shall mainly be concerned with the facts of consciousness in the ensuing pages. The terms mind and consciousness may be, and often are, used as if they were synonymous; that is to say, as if consciousness were mind and the whole of mind, so that a complete analysis and comprehension of all conscious states would imply a complete knowledge of the essential nature, the very substance, of consciousness.

The recent consideration, however, of facts, many of which have long been recognised, has rendered this conception of consciousness as the whole of mind quite untenable. We realise now that there are psychical or mental activities which are unconscious, which lie below the "threshold of consciousness," but which are of most positive reality and vast importance. These activities, first clearly recognised by Hamilton and Laycock of Edinburgh, have been variously named. Carpenter originated the phrase "unconscious cerebration"; Myers spoke of the "subliminal[1] mind"; and various other phrases have been in vogue; but the important facts are the unquestionable reality of these activities, their unquestionably psychical nature, and the circumstance that, though they are intimately related to consciousness, and may indeed be the root and branch of which consciousness is merely the flower or efflorescence, and though they

[1] From limen, a threshold.

may at any time rise into consciousness, yet they exist for themselves and may be in full process during the profoundest sleep.[1] And since we cannot study consciousness without relation to them, and since they are none the less important because they can neither be handled nor experienced, but can only be inferred, we must recognise their existence in our definition of psychology, which we therefore call the science of mind—a definition by no means necessarily pledging us to a "disastrous dualism," Dr. Ward notwithstanding.

It is evident that the study of mind, the very organ and source of all knowledge, must very nearly concern all other branches of knowledge or study. It is desirable, therefore, to make a brief digression in order to define certain terms with which psychology is closely related, and from which it is scarcely yet distinguished.

Seeking a title for the treatise which their master composed *after* his "physics," the followers of Aristotle coined the term *metaphysics*. Plainly, this is no term for modern use, for it expresses nothing but an accidental circumstance. Its use might be defended, certainly, if Aristotle's treatise were confined to any one well-marked study, but it is not. Nowadays we have in use such terms as logic and psychology, which correspond to clearly marked sciences. The term metaphysics is, therefore, most frequently used to express the study of Reality, the ultimate Being or Thing that Is; whether that be mind or matter, or both, or

[1] Recent authorities object to the word "unconscious," and prefer to speak of these activities as *subconscious*.

neither, or God, or Energy, or the Absolute, or aught else. But the word suggests none of these things, and so there has been coined a new term which finally disposes of the need of the term metaphysics at all. This ancient word, vague and formidable in most ears, will scarcely occur again in this book.[1] But we shall frequently encounter the new term *Ontology*, which is simply Greek for the *science of Being*. Now, it is ultimate Being or Reality that is the quest of philosophy; and, for the philosopher, the man who seeks to know the secret of existence, psychology is of interest exactly in so far as it serves ontology. The nature and measure of this service will often be discussed in the following pages.

There is yet another long word which must be named, since the reader will find it frequently occurring in psychological treatises. This word is *epistemology*, the science or theory of knowledge. The business of epistemology is to discuss the knowing process, the conditions of our knowledge, its validity, and its limitations, if such there be. Obviously, this is a matter in which psychology is the final judge. Hence we may note a somewhat remarkable fact in the history of human thought. It might reasonably be hazarded that any one who set forth to frame a theory of things in general, or particular, would regard it as necessary to preface his conclusions with a discussion of the nature of human knowledge and the measure of its trust-

[1] Says Ward: "A generation ago it was common—except in Germany—to lump psychology and philosophy together under the common title of Mental Philosophy or Metaphysics."

worthiness. But we find that this logical necessity has not been recognised, save very fitfully and partially, by even the greatest thinkers of earlier times. Plato certainly had a theory as to the nature of our ideas; so had Descartes and Berkeley and Locke. But though Locke must certainly be regarded as the founder of modern psychology, even he did not leave a systematic epistemology. Plainly, the absence of this all-important criterion of knowledge from the works of his predecessors was due to the fact that the science of mind had not yet achieved independent existence. It is to Immanuel Kant, the immortal philosopher of Königsberg, that we owe the first deliberate attempt to attack the problem of epistemology. And, since it is epistemology that is an indispensable criterion or critic of all assertions whatsoever, the distinctive life-work of Kant is known as the *critical philosophy*.

Yet another term must be briefly discussed ere we can proceed with our subject. We have attempted to gain an appreciation of the words psychology, metaphysics, ontology, epistemology; but in discussing them we have had occasion to employ a word more familiar and far more beautiful than any of these, the word *philosophy*. Plainly, the word means love of wisdom, but it is nowadays made to do duty in many ways, most of which are unworthy of it. The term mental philosophy, still in not uncommon use, may be noted, as marking an early attempt to identify psychology and rescue it from the welter of metaphysics. But the term is here quoted merely that we may note its historical interest. As to the word philosophy, we

may briefly observe that it may legitimately be employed in two senses. It may be applied to the *quest for reality*, the science of Being, which we now, for sake of definiteness, call ontology; or it may be employed, according to Spencer's definition, to denote "completely unified knowledge" or any attempt at such unification. We note these legitimate applications of the term, and remark that, in either case, psychology has the first and last word, in virtue of its concern with the supreme fact of mind.

The necessity for our digression is immediately apparent when we proceed, as plainly we must, after defining psychology as the science of mind, to ask what mind is. Every possible answer to this question implies either an assertion of some ontological theory—some theory as to the nature of reality—or else a denial of some such theory.

For, in the first place, there are the many forms, ancient and modern, of the theory which regards mind as the only Reality or the only Reality save the Deity. This theory, or group of theories, we call *idealism*. This is one of the terms which cannot be ejected from a science which is almost buried under a waste of uncouth terms. If one attempts to define idealism in any precise fashion, one is sharply brought to book by some idealist or other for parodying his views. Therefore no attempt will be made to define idealism in general, save in the loose terms already employed, and still less to venture into the mysteries of "subjective idealism," Platonism and the Platonic theory of ideas, Hegelianism, the idealism of Berkeley, which cannot

be named without a word of profound respect, or the recent Oxonian variety of German idealisms, as represented by T. H. Green or Principal Caird.

Suffice it that here we unreservedly reject all the genera and species and varieties and individual specimens of this order of thought. As psychologists of the present day we repudiate it *in toto*. Not merely have we no use for it: not merely do its inconceivable propositions, its countless contradictions, its inability to preserve its type for one brief generation, its elusiveness, its utter irrelevance to facts, cause us to regard it with something very like amusement or even contempt; but rather do we conceive our study from a point of view which directly and irreconcilably denies the idealist hypothesis. "If the idealist be right, evolution is a dream," said the author of the theory of evolution; and it is from the evolutionary standpoint that we contemplate mind in these pages. Let us now note the profound antithesis between the evolutionary and the idealist conception of mind. It is perhaps the most fundamental controversy in philosophy.

Mind, in the eyes of the idealists, is a prime fact, an absolute fact; a thing without antecedents, without causes, without a history, without an origin—save in so far as it is conceived to have been minted once and for ever by the Deity, or, as some aver, to be a part or spark of the Divine. For the idealist mind is thus a thing unconditioned, a thing to be accepted and studied as it is, a thing of which there exists but one kind, the normal mind of man, and its degradations as in insanity, immorality, or imbecility. But, whereas for the idealist no external

thing, nothing that is not mind, can throw any light upon mind, whereas no physical fact or principle can serve to elucidate the nature or properties of this prime entity, it is rather to mind that he turns in seeking to explain and understand all those things which we who are not idealists regard as existing outside and independently of mind.

For the idealist these things have no independent existence. The sun, his own head, his child, a mountain, the book he has written or is reading—none of these things, according to him, can be conceived as existing save in the presence of a perceiving mind. In the words of Berkeley, the profoundest and most consistent of idealist thinkers, the *esse* of everything that we call material or physical is *percipi*—its *being* is the *being perceived;* if unperceived, it is not. In justice to Berkeley, though the observation is scarcely cognate to our subject, we may note that he did not maintain matter to be annihilated with the cessation of his own or any other mind. He taught that what we call the physical universe would continue to exist, even though there were no man to behold it, in virtue of its being perceived by the Divine mind. This is, indeed, an excellent escape from an obvious difficulty; but the case is not so simple for subsequent idealisms, whose conception of the Deity is not anthropomorphic but pantheistic, who regard the Deity not as a great personality apart, but as the "power that rolls through all things."

This, of course, is not the place in which to discuss the difficulties or achievements of idealism. It is our business merely to note the idealistic conception of

mind as a prime fact, and to contrast it with the evolutionary conception.

The evolutionist maintains, like the man in the street, that he *can* conceive of the existence of physical things in the absence of any perceiving mind. The evolutionist believes that there was a time when no life existed upon the earth, whose surface—rolling tides of molten lava, as geology teaches us—was far too hot to admit of the existence of even the simplest organic compound. He believes—what is to the idealist inconceivable—that such an earth once existed, though unperceived by any human eye. He believes that, at length, when the conditions which he regards as essential to the production of life were attained, there arose, by a spontaneous generation in earth, or air, or ocean, the first living things. He does not credit these primitive organisms with much mental power. He hesitates to say that they were conscious, save in a degree which the anthropomorphic value we attach to the word consciousness scarcely permits us to imagine. In a word, the evolutionist is said to regard life as prior to mind, and as a means of its evolution. For myself, I consider that last phrase very loosely and carelessly worded, but it was written by Dr. Ward as descriptive of the evolutionary doctrine of mind. Of this doctrine he goes on to say: "It burdens science with two insoluble problems instead of one. For even if it were possible chemically to build up protoplasm we should still be as far from organisms as a heap of bricks are from putting themselves together as a house"[1]

[1] Article "Psychology," *Ency. Brit.*, tenth edition.

dictum which is as illogical in thought and irrelevant in substance as it is ungrammatical in form. But it is of interest as illustrating the manner in which the academic psychologists are wont to treat those workers to whom we owe all that is known of mind.

The evolutionist, then, differs irreconcilably from the idealist in regarding "life as prior to mind." More broadly stated, the evolutionary proposition is that not-mind, as illustrated by the material substance of our planet, existed before mind — in any recognisable form — was found thereon. He regards mind as itself, in common with all other things whatsoever, a product and phenomenon of evolution. He believes that mind, like life and matter, has a history; and, since he can distinguish between mind and matter without asserting any ultimate dualism, he regards the evolution of mind and of not-mind as inextricably intermingled and interdependent, since he, like the idealist, persists in regarding the Sum of Things, mind and not-mind, as a "flawless unit of fact."

The evolutionary view of mind, which now informs psychology, we owe to the genius of Herbert Spencer, who enunciated it in his ever-memorable "Principles of Psychology" in the year 1855. The half century that has since elapsed has witnessed the fruition of this great idea, and it is upon that fruit that the reader is asked to feast in the following pages. But it is first necessary to consider another ontological theory, and yet another.

We have rejected the theory that the ultimate Reality is mind—a theory which is tantamount

to asserting an identity between psychology and ontology. Now, the doctrine most opposed to idealism is termed *materialism;* and it must here be considered.

Materialism[1] asserts that the ultimate reality is matter, and that mind is merely a property of matter under certain conditions. This was always a doctrine that displeased those in authority, and the absurd confusion between philosophic materialism and what may, for convenience, be called practical materialism—which has nothing whatever to do with it—has aided those in high places to fasten a sinister meaning to the term, as implying something of moral degradation in its exponents. In justice to the many sincere and upright persons who have held this doctrine, it is necessary to observe that the proper way in which to oppose materialism is not by abuse, but by argument. The academic philosophers, however, have nearly always adopted the less excellent way, and have then not infrequently had the effrontery to comment upon the fact that their opponents disliked the name of materialist. The innuendo is that the materialists dislike the name because they do not care openly to publish their shame; but the truth is that they dislike it because their opponents have contrived to cast a moral slur upon it.

I write thus simply in the interests of fair-play. Materialism is now an untenable doctrine, and with its fall has fallen the materialistic theory of mind, which asserted that mind is an occasional property

[1] I mean, of course, the philosophic doctrine of this name; not the love of wealth or the possession of many motor-cars.

of matter. As far as the onslaughts of the word-jugglers in high places are concerned, materialism might have stood for ever. Materialism was a product of imperfect science, and, as such, it was immune to hard names and verbal sophistications, but susceptible to the criticisms of a less imperfect science; and those criticisms have compassed its fall. The facts of radio-activity, and the modern theory of matter as the expression of a non-material *Something* that underlies it, have cracked the clay feet of that unpleasing image. Modern physics teaches us that our concept of matter is only *symbolic*. No physicist of to-day would venture to support the definition, "matter is that which occupies space"; no such physicist can venture to assert of matter anything more than that it is one expression of an intangible and invisible power of which, in itself, we know nothing. There is nothing ultimate or final or substantial—in the proper and original sense of that word—about matter. Our concept of it is only symbolic; and to assert that mind is a property of something, which is itself only a proximate symbol of a deeper something, would be to write oneself down a fool. Materialism is now proven, by the successors of the men who set it up, and by the extension and amplification of their methods, to consist in regarding a symbolic concept of a proximate thing as an absolute concept of the ultimate reality. Materialism was built upon sand; the wind and sea fell upon it and "great was the fall of it." We may leave the materialist theory of mind amongst the ruins.

The materialist regarded mind as an occasional property of matter; the idealist regards matter as the creature of mind. We have rejected the views of both. Plainly, there remains a third possibility. It will be well for us, as evolutionists, if this, like the materialist theory which we have had to reject, is compatible with our concept of mind as no prime fact but a product of the past. This third possibility is that mind and matter may not stand to one another in the relation of cause and effect, as the idealists assert, or effect and cause, as say the materialists. This third hypothesis seems to force us to accept a dualism, or twoness, in the Universe. The idealist positively asserts that there is no escape from it. And indeed there would be no escape if we regarded mind and matter as ultimate substantial[1] facts. The idealist does so regard them. Totally ignoring, for instance, the facts of subconsciousness, the idealist is quite certain that he knows mind through and through; there is no substance underneath it that escapes him. Similarly, he has no doubt whatever that he fully understands matter; knows *it* through and through. He commonly expresses his fine and discriminating knowledge of matter by calling it "brute" matter or "dead" matter. If students of Nature thought as do these students of words, who spend their years in constant re-shuffling of the same old pack of cards, they would have to admit that the denial of a causal relation between mind

[1] Again this splendid word is used in its rightful Spinozistic sense. Substance is that which *stands under;* the actual existence that underlies appearances.

and matter was tantamount to a denial of the monism or doctrine of the ultimate oneness of all things which is the unalterable creed of every serious thinker; but the students of facts find cause to believe that the dualism or twoness of mind and matter is only proximate and apparent, and that it may be resolved into a monism by the conception that mind and matter are converse expressions of one and the same undivided reality underlying both.

As to the possibility of interaction between mind and matter, and as to the proper language in which such possibility may be expressed, we must await another chapter. Meanwhile we are compelled to consider yet another ontological theory, which is called realism.

The doctrine of realism in its simplest form is easy of comprehension. There is not one man in millions who does not hold it. Whereas idealism asserts that the external world is a product of mind, and has thus only an *ideal* existence—that is, an existence in the world of ideas—realism asserts that the external world has a real existence—exists independently of any ideas in any perceiving mind. Now, there are two varieties of this doctrine which must be most carefully distinguished from each other. The first is the naïve realism of "common-sense," which declares in brief that things are what they seem. A chair, for instance, says common-sense, is simply a chair—what else could it be? In virtue of its own nature it has hardness, extension or the power of occupying space, colour, rigidity or elasticity, and so forth. We may use

Spencer's term and distinguish this doctrine as crude realism. The reader will see that it is identical with materialism as that doctrine could be held thirty years ago.

Now, we have seen, very briefly since this is not a treatise on matter, that physics itself has overthrown the foundations of materialism. It remains to observe that psychology has overthrown the assumptions of crude realism.

Let me employ my favourite illustration.

The plain man, present at an orchestral concert, listening to the music and watching the conductor, has no doubt that the music and the conductor's motions are what they seem. Let him, however, conceive a slight alteration in his nervous apparatus. Let him imagine that the fibres of the optic nerve, which run backwards from his retina to the vision centre of his brain, are switched off so as to run backwards and sideways to his hearing centre. Similarly, let him imagine that the fibres of his auditory nerves run from his ears, not to the hearing but to the vision centre. He would then hear the conductor's movements and see the music. But if he had had no experience of any other state of affairs he would doubtless express no surprise, since he would still be under the intimate conviction that things are what they seem. He is a crude realist. In contradistinction to this form of realism is that for which we may adopt Spencer's name of transfigured realism, though it is, of course, far older than Spencer. Transfigured realism is realism because it asserts that things *are*, whether or not they seem or appear to any mind, whereas idealism

asserts that they are only in so far as they or appear to a perceiving mind. But transfigured realism differs from crude realism in asserting that things are *not* what they seem. It asserts that the mind has a share in the making of the characters which it attributes to its objects. Now, idealism asserts that the mind, in virtue of its own nature, creates all the characters which—presumably by a curious delusion—most men persist in regarding as having something to do with what is not mind. Crude realism believes that the mind is simply a passive spectator. It looks on and sees whatever there is to see just as it is. Plainly, then, transfigured realism is the mean between two extremes; it combines and harmonises the assertion of the realist that there is an external world and the assertion of the idealist that our perceptions of that external world are coloured and controlled by the characters of the mind that perceives it.

Many of the most valuable terms in psychology have undergone such degradation by common use that the writer on this subject is almost debarred from using them. Substance, for instance, conveys to scarcely any one the meaning in which it was used by Spinoza. Realism suggests the novels of Zola. The Idealist is a man who is always building castles in the air. The Materialist is a man who, to use a vulgar term for a vulgar idea, is always "on the make."

But no psychological term has been more abused than the word phenomenon, and its derivative adjective. In common parlance a phenomenon is a wonder,

and phenomenal means remarkable. The literal English translation of the Greek word "phainomenon" is a *seeming* or, to use a Latin synonym, an appearance. When the psychologist speaks of a phenomenon, then, he means an appearance. When he uses the word phenomenal of anything he means that it is an appearance or has the character of an appearance. According to transfigured realism the external world, and even mind, as we know it, are phenomena—appearances of an underlying reality. Thus, on our theory, it is not phenomena that are wonderful and remarkable, but the substance that underlies them—not appearance, but reality. Let us now, after this long preliminary discussion, pass on to a more complete consideration of the relations between mind and matter.

CHAPTER II

MIND AND MATTER

In the present chapter we retain the old antithesis of mind and matter, not because we fail to recognise the new light which has lately been thrown upon the nature of matter, not because we think mind and matter, as we know them, to be ultimates, but merely for practical convenience. Hitherto we have talked more or less at large, but now we must condescend upon something concrete and specific. The mind of man, to take the most important instance, is related in some way to that aggregation of matter which we call his nervous system. If

we compress the two great arteries that carry blood to his brain, he drops unconscious to the floor in less than two seconds. If we apply a fist to his eye he sees stars. If we pass morphia through his brain he dreams dreams. There is some sort of relation or parallelism, by whatever name you care to call it, between mind and matter.

It will shortly be necessary, of course, to study the nervous system of man in some detail. But every reader has abundant knowledge already to suffice for the present discussion of this supremely important question as to the relation between mind and matter, or, to use the current jargon, between psychosis and neurosis—the psychical fact and the neural or nervous, that is to say, material, fact. There are three possibilities, are there not? Either changes in matter may cause changes in mind, but not conversely, or changes in mind may cause changes in matter, but not conversely, or changes in either may act as cause of changes in the other. Already we are in the midst of apparently insuperable difficulties. For how can we conceive of a sequence of material events as causing another sequence of events which belong to the psychical? The most convinced materialists have found themselves utterly at a loss to explain such an event. The notion of causation, as we possess it, completely fails us here. We can understand how a billiard ball may push another billiard ball, an atom another atom. We cannot understand how a combination of billiard balls, or of atoms in the brain, can produce consciousness. I quote from Tyndall's "Apology for the Belfast Address":—

Do states of consciousness enter as links into the chain of antecedence and sequence, which gives rise to bodily actions, and to other states of consciousness; or are they merely *by-products*, which are not essential to the physical processes going on in the brain? Speaking for myself, it is certain that I have no power of imagining states of consciousness, interposed between the molecules of the brain, and influencing the transference of motion among the molecules. The thought "eludes all mental presentation," and hence the logic seems of iron strength which claims for the brain an automatic action, uninfluenced by states of consciousness. But it is, I believe, admitted by those who hold the automaton theory, that states of consciousness are *produced* by the marshalling of the molecules of the brain, and this production of consciousness by molecular motion is to me quite as inconceivable on mechanical principles as the production of molecular motion by consciousness. If, therefore, I reject one result, I must reject both. I, however, reject neither, and thus stand in the presence of two Incomprehensibles instead of one Incomprehensible. . . . I bow my head in the dust before that mystery of mind which has hitherto defied its own penetrative power, and which may ultimately resolve itself into a demonstrable impossibility of self-penetration.

Whilst we can understand, or think we can understand, how a billiard ball may be pushed by a cue, we are completely at a loss to understand how a billiard ball could be pushed by an idea. How can anything impalpable, non-material, utterly distinct from anything palpable or material, be the cause of changes in a material thing? "Which of you by taking thought can add a cubit to his stature?" Again our notion of causation fails us.

But if we can conceive neither the action of

matter on mind, nor the action of mind upon matter, we plainly cannot accept the third possibility, that each acts on the other.

Nevertheless, an interesting comment falls to be made upon the preceding paragraphs.

Whilst few of us will maintain that an idea can push a billiard ball, there are very many who will, and do, maintain the possibility, nay, the constant occurrence, of a converse action. They think they have no difficulty in conceiving how the redistribution of a number of atoms in the brain can cause the production of ideas. But a moment's consideration will show that if the one notion is untenable so is the other. If an atomic collision can cause an idea, then an idea can cause an atomic collision; but, as we now see, idea and collision are in different worlds.

Perhaps there is something the matter with our notion of causation. Perhaps, indeed, it is impossible to be quite sure that we really understand what we mean by causation. Let us, then, attempt to get out of our difficulty by using other language. Of course if it is a real difficulty we shall not help ourselves by talking about it in different terms. We need not share that delusion of the metaphysicians. But if we have made the difficulty by our language, the use of other language may serve us in good stead. The relation between psychical and material states may be expressed as a *parallelism*. We may argue, not that the material changes cause the psychical, as they certainly appear to do, but that they are accompanied by one another, or that "psychosis and neurosis are the subjective and objective faces of the same fact."

This may otherwise be expressed thus: "The physical and the psychical are two modes in which one series of real events appears to us, and therefore the two series of appearances run parallel to one another." This I regard as the most defensible form in which may be stated the doctrine of *psycho-physical parallelism*, which we owe to the greatest psychologist now living, Professor Wilhelm Wundt, of Leipsic. It may also be stated in dualistic form: "The two kinds of events, the physical events of the brain and the psychical events or processes in consciousness, form two series that run parallel to one another, but never meet or interact."

The hypothesis of Wundt is extremely attractive, and appears to offer fewer difficulties than the opposite hypothesis of *psycho-physical interaction*, which declares that mind and body *can* act on one another, and that we are not entitled to deny this merely because we find ourselves, or our concept of causation, unequal to the task of explaining such interaction. Nevertheless, I do not propose here to set myself up as an arbiter. It seems to me that the difficulties of either view are a bar to any more than the most provisional acceptance. Fortunately, however, it is possible to learn and appreciate many psychological facts of great importance and interest without having formed any final conclusion as to a problem which many think to be, in the nature of the case, insoluble. These facts we may appreciate, whether we hold Wundt's theory of psycho-physical parallelism, or the theory, held by not a few,

that "the action of mind on matter is the only kind of action or causation that we are capable of understanding," or the "*conscious automaton*" theory of Huxley, according to which consciousness is a mere by-product or "epiphenomenon," the interested but impotent spectator of its own activities, which are the product of mechanical and chemical sequences.

Needless to say, the idealist laughs at our manifold difficulties, all of which can be conveniently avoided by adopting his theory. He declares that we have made all these difficulties for ourselves by insisting on the independent existence of the external world. Admitting the existence of mind alone, and declaring matter to be merely a "convenient fiction," a creature of the mind's creating, he is not faced with any difficulties as to the relations between mind and matter. True, he has some little difficulties of his own; but into these we cannot enter here. Suffice it to note the reasons why resort is had to idealism. Into whatever absurdities it may lead its adherents, at any rate it disposes of the difficulties which we have been discussing, and, also, there is not presented to it the crowning difficulty of realism, which is to conceive *how* we are conscious of that which exists outside our consciousness. The idealist solves this puzzle by declaring that the external world is merely the "content of consciousness." As has been very loosely said of it, "Into the man's head the whole world goes, including the head itself."

At the conclusion of the next chapter, which discusses the evolution of mind and the nervous system, we shall find it necessary to return to the question of the relation between mind and matter under a somewhat different aspect.

CHAPTER III

THE EVOLUTION OF MIND

It is my purpose, in this little volume, to treat of psychology—however briefly—in all its chief aspects. The reader will understand that many a treatise might be written on the relation of psychology to the problem of ontology—the Nature of Reality; and some attempt has been made, in the preceding pages, to indicate this relation. Again, we may have what Wundt calls *physiological psychology*, which describes the nervous system, its structure, functions, and properties, in especial relation to the facts of sensation and consciousness in general. Closely allied to such a treatment of the subject is the study which Wundt, again, was the first to christen *experimental psychology*, which is properly prosecuted, not on paper, or by means of abstract thought or hypothesis, but in well-equipped laboratories, such as now abound, especially in Germany and America. Its predecessor was *psycho-physics*, which attempted to estimate and measure precisely the intensity of sensations and the ratio between sensation and stimulus. But in this series we must especially consider psychology from the stand-

point which will enable us to discern its relations to the theory of organic evolution and to the problems of society and morality. Hence we must now proceed to discuss the evolution of mind.

The genetic psychology, as it is often called, begins by assuming the objective existence of the external world. It very naturally confines itself to that portion of the external world which we call the earth, and to the evolution of mind thereon. The first question it has to ask itself is as to the point where its investigations must begin. Historical biology begins, of course, with the first living things, or perhaps with the inorganic conditions which immediately preceded their evolution. And the psychologist has to ask himself whether he has any concern with these first living things, or, if not, at what point in the history of life his subject-matter, which is mind, emerges. Now we cannot marshal before us for present observation the past succession of living forms, but we may assume that if we contemplate the various forms in which life is manifested to-day we shall be engaged in a parallel or analogous process.

As to the existence of mind in man there is no dispute. But directly we pass to his inferiors there arises the possibility of controversy. Descartes, for instance, maintained that animals, or, as we should now say, the lower animals, are automata. But no one maintains this doctrine to-day, and there are many who suspect that Descartes advanced this view, not because he believed it, but because he desired to protect himself from theological

persecution. Descartes was a great thinker, but not a great man. The evidence which leads us to believe that a dog or a bird is conscious, is identical in every particular with that which leads each of us to infer that his fellows are conscious. In the last resort this belief, whether held of a fellow-man or of the bee which you observe choosing a flower it likes, is only an inference. Consciousness cannot present itself to consciousness save through the intervention of the physical. "Spirit to spirit can speak" only by means of a material medium. But no one will dispute the validity of the inference. For if he doubted it what would be the use of saying so, there being none to hear?

Of course there is an almost unavoidable error which constantly intrudes itself into all our speculations as to consciousness other than our own. The only consciousness of which any of us has first-hand knowledge is his own, and he tends to judge others by himself. Not infrequently this tendency leads him into error. It may be called automorphism—the attribution to others of our own form (Greek "autos," self; "morphe," form). When the race, as a whole, in accordance with this universal tendency, makes its god after its own image, we call the tendency anthropomorphism. But this habit displays itself also when we look beneath us, and it must be most carefully guarded against, in so far as may be, in our consideration of comparative psychology, which compares the forms of mind throughout the animal kingdom, or the evolutionary psychology, which seeks to retrace the history of mind.

When it is further asserted, then, that mind is to be found far lower than the lowest limits of the vertebrate kingdom, we must not imagine that the consciousness of a moth, for example, is like unto our own; nor must we, on the contrary, be heard to deny that the moth has consciousness, simply because we cannot believe that it can have such consciousness as ours. A few moments ago, a large white moth flew in through the open window from the darkness, and fluttered round my incandescent lamp. I remember, also, that a little baby this morning stretched out its hands for the lighted match which I happened to strike before it. Doubtless there is a vast difference between the consciousness of an adult, who likes a sunny day or ballroom brightly lit, and that of a five-months-old baby; but no one will question that the one is only a more highly developed form of the other. Similarly, it is impossible to consider the cases of the baby and the moth without believing that the process in virtue of which they are both attracted by a bright light, is essentially the same in each case, even if we had not the visible eyes of the insect from which to draw the obvious inference.

If we proceed to press the comparison further, it will serve to illustrate the manner in which consciousness alters as we trace it downwards. When, at last, that baby chances to grasp a flame, it will suffer acute pain, the effects of which will irradiate throughout its nervous system, and will cause motor disturbances in its limbs and larynx, increased secretion from the tear-glands, and so forth. The

moth, however, which has burnt its wings cannot properly be conceived as suffering pain more than remotely comparable to the pain inflicted upon even the immature human being. Nevertheless, there is a parallel change excited in both cases. If the pain of the burn be extreme, the child will suffer from *shock*, which kills so many burnt children. There is no pain, but rather apathy, listlessness, passing into cessation of consciousness. The effect upon the moth is similar; it is dazed, stunned; it, also, suffers from shock, as a result of the violent stimulation of its sensory nerves. Plainly, we can identify an elementary form of consciousness in a moth. How much lower may we go?

In common speech, and in much serious writing, it is constantly assumed, in matters of all kinds—scientific, artistic, political, or what not—that there are sharp lines between things. But these sharp lines are really, when we come to consider the matter, an instance of the mind's contribution to its conceptions, of which we have lately been reading. Such sharp lines do not exist in Nature. They are born either of human ignorance or of the mind's necessity in formulating its conceptions. The facts of consciousness are a case in point. As we passed downwards through the animal kingdom we gradually left behind us certain properties of mind, such as the human prerogative of self-consciousness, the power of forming ideal conceptions, the power of learning by experience—though this may be found much lower than might be thought—and so forth. Nevertheless, even as low in the scale as the moth, we have found unmistakable

evidence of consciousness, which is part of mind. If we go lower still we need not expect suddenly to reach a point where we can say, Here consciousness begins or ends. Nature does not know these sharp breaks; *Natura nihil facit per saltum*—she does not proceed by leaps. In tracing consciousness downwards and backwards, then, it will be well to ask ourselves what, if any, is the unit of consciousness; what is the very simplest psychical fact that can be recognised? Plainly, the unit of consciousness is the simplest possible sensation. Where there is sensation, where something feels or "is conscious of" something else, there is a fact for psychology. "The desire of the moth for the star" may be put down as instinctive, may be called a mere "tropism"—a term presently to be explained—but it is a psychical fact.

If this be granted, we find ourselves compelled to go down much lower than the insect. We find ourselves compelled to recognise the elements of psychical facts even in organisms which possess no differential nervous system whatever. But before we consider such organisms, let us turn for a moment away from the animal kingdom altogether.

Greatly daring, let us actually consider the sunflower. The poet would say that it turns to the sun out of love and gratitude, metaphorically attributing consciousness even to a plant; and certainly such an attribution would be only metaphorical. But we have declared that a sensation is a psychical fact, a declaration which no one will dispute, and it behoves us to take the

consequences or withdraw it, which we may not do merely on the ground that it leads us further than we expected. What, then, of the "sensitive plant" sung by Shelley? Does *it* yield subject-matter for psychology? What of the sleep of plants—their condition of lessened response to stimuli? What of the extraordinary growth-sense or sense of gravitation possessed by plants, and lately studied by Mr. Francis Darwin? From the actions of a fellow-man, or a dog, or a moth, in response to certain stimuli, we regard ourselves justified in inferring their possession of consciousness. The vision of the moth is doubtless very different from that of a man. Doubtless the visual sensations of a new-born baby are very different from those of a man. Doubtless the visual sensations of one man may be very different from those of another;[1] but that there is a fundamental identity between them all, we cannot doubt. Now, the sunflower's constancy to the sun cannot be interpreted as vision,[2] I admit, but if we are justified in inferring the occurrence of sensation —that is, an element of consciousness—in the moth, what justification have we for refusing to draw a similar inference from the response of the *Drosera* leaf to a touch? It will be replied that the curling-up of the leaf of the sensitive plant is a purely mechanical response to a purely mechanical

[1] "Don't you wish you could?" was Turner's alleged reply to the lady who objected that she had never seen such colours as he depicted.

[2] It is due to the more rapid growth of the stem-cells which are in the shade, and which thus tilt the flower over towards the source of light.

stimulus; that there is no reason to admit the occurrence of sensitiveness or sentiency or sensation as a factor in the process or as an accompaniment of it. Such an answer may perhaps be accepted; but when we attempt to draw the line between consciousness and unconsciousness, between conscious response and unconscious response, we find the task impossible of execution. We must persistently remember that we have none but inferential knowledge of any consciousness save our own. The inference is irresistible in the case of a fellow-being. It is irresistible in the case of the dog; it is hardly disputable in the case of the moth, especially when we observe the moth at different times, and find it presenting all the indications of sleep at one time and wakefulness at another. Indeed, as we pass downwards we are compelled to ask ourselves what are the criteria which we employ in each case. Proximately, the indication of consciousness in every case, including the case of our fellow-man, is some movement—some movement in response to a stimulus. Now, the power to display movement in response to a stimulus is known to the physiologist as *irritability*, and he asserts that it is a fundamental property of living matter, characteristic of protoplasm in all its forms. If, then, we are to be content with our proximate criterion of consciousness, we must assert that just as we assume the presence of consciousness in the responsive man, so we must assume its presence in the responsive leaf. Or, lest we be confused by a word, we may use the term sentiency, the power of *feeling*—plainly a psychical fact. Now, the unconscious man—that is,

the man asleep—will still respond to stimuli. If he fails to respond to all stimuli, he is not asleep but dead. But if he responds, whilst asleep, to a stimulus, we infer that *something felt it.* The stimulus, in point of fact, was appreciated. The man is asleep, but some nerve cells in his spinal cord must have been awake. The response is evidence of a psychic fact.

If we admit this for the unconscious but living man, how can we decline to admit it for the always "unconscious" but living plant? How much meaning, if any, can we admit in such a phrase as "a mechanical response to a mechanical stimulus"? A pin-prick is a mechanical stimulus, and the withdrawal of the injured limb is a mechanical response. Nevertheless, it is from this mechanical response that we infer the occurrence of a psychical fact. We know that our friend *felt* the pin, because he drew his arm away. If the inference from the mechanical *response*—mechanical in the sense that the response consisted in the motion of a certain portion of matter—is justified in the case of the man, why is it not just in the case of the leaf?

You may reply that your criterion of sentiency—*i.e.* of the occurrence of a psychical fact—is not merely the fact of response to stimulation—*i.e.* the fact of irritability common to all protoplasm. You may say that you infer the occurrence of sentiency only where the response is purposive or has a meaning. You pinch a child's finger, and it is withdrawn. You infer the occurrence of a psychical as well as a physical fact, because there

is a purpose in the withdrawal—the child, or the child's spinal cord if the child be asleep, withdraws the finger in order to avoid the injury. But this criterion is quite worthless; the response of the plant to the indications of its "sense of gravitation," or the sensitive leaf to the pressure of an unwary insect, are certainly purposive—they serve a purpose.

Let us, then, deliberately seek the very lowest and simplest forms of living organism that we can discover, and let us observe them. It is of interest to note their place in the classifications of the biologist. We have considered in brief the question of sentiency in certain of the higher plants, actually venturing to allude to the vegetable world in a book on psychology. But it is now necessary to consider the facts that may be observed in the behaviour or conduct of the simplest organisms we know, such as the bacteria. Now, these humble micro-organisms are classified by the biologist as *plants*. They constitute, it is said, the simplest kind of the plants known as Fungi; and, as they multiply by splitting, they are called the Schizomycetes or Fission-Fungi. Certain serious criticisms may be passed on this classification; and I will not venture to infer from it that, if sentiency can be observed in the bacteria, *therefore* we have demonstrated the existence of psychical facts in the vegetable world. But, at any rate, I will venture this proposition, that when we seek the simplest organisms it becomes a nice point to decide whether they are animals or plants; and those who have examined the origin of the water-tight compartments in which we are apt to arrange

our conceptions are inclined to the opinion that some of these lowest organisms cannot be regarded as either animal or vegetable. They are neither or both.

When we examine the activities of such simple organisms, which we take as presenting to us the simplest varieties of protoplasm obtainable, we find that they display irritability or the power of response to stimuli. Such responses or "tropisms," as they are called, are capable of analysis in somewhat remarkable measure. They accord with constant principles, whether we observe them in a bacterium, or in the white blood-corpuscles of man in the act of attacking such a bacterium, or in the case of a spermatozoon or a pollen-grain. These tropisms are a series of systematic responses to the environment. They are certainly mechanical or chemical responses to mechanical or chemical stimuli; but they unquestionably serve the purposes or ends or needs of the organisms that display them. Now, *the* end of all living things is "more life and fuller." Hence these tropisms correspond to the vital needs of the organisms that display them. This is a generalisation that will be supported by all who make an adequate survey of the *data*. It is not invalidated by the many cases where the "instinct" is misleading and disastrous, as in the case of the stunned moth. I may quote one or two familiar instances of tropism ere we address ourselves to the meaning of these facts for the psychologist. The moth flies towards a source of light, a centipede flees it; the one is said to be positively heliotropic (Greek "helios," the sun),

the other negatively heliotropic. Certain cells of a seed, destined to form the root of the plant, grow downwards, and are said to be positively geotropic. Others, growing upwards, and destined to form the aerial portion of the plant, are said to be negatively geotropic. Similarly with chemical stimuli. Take the case of the white corpuscles attacking the micro-organisms of malaria in a drop of human blood. In certain conditions there is a positive "chemiotropism." The corpuscles attack, "are attracted to" the intruders, envelop, and destroy them. In other conditions the corpuscles flee the intruders—a case of negative chemiotropism. The difference in behaviour may depend upon the absence or presence of quinine, or a particular percentage of quinine, in the blood. But in any case there is response of some sort to a chemical stimulus. Now, no one proposes to assert that these corpuscles are conscious as their owner is conscious. But, pray, what language that does not imply the occurrence of a psychical fact are we to employ? The critic may laugh if we roundly declare the leucocyte to be conscious; but he will often let pass such a phrase as that "the leucocyte *is conscious of* the presence of the intruder." Or shall we say that the leucocyte *is aware*, or that it *knows*, or *feels*, or *appreciates*, or *recognises?* If the inference is justified that your responsive friend is conscious—since you know that your own responses are accompanied by consciousness — why not a similar inference in the case of the responsive leucocyte?

Now it is precisely in order to avoid the necessity

of drawing such an inference, and in order to avoid the use of all terms implying such an inference, that men have been led to speak of positive and negative "tropisms." Dr. Ward, in criticism thereupon, remarks: "If such language serve any useful purpose, all well and good; only it must be applied to the hungry man too; in short, all behaviour must be described in the same terms." And surely Dr. Ward is right. If, now, we make the attempt, we find that all behaviour *can* be described, and that quite easily, in the same terms. That is to say, all organic activities can be described with an eye solely to their outward and visible signs, to their mechanical aspect, *in mechanical language*. But when we have done so, we see the justice of Ward's criticism. The language of tropisms was invented in order to show that consciousness or mind or sentiency has no place in the activities of the simplest organisms. But we find that it can be applied, with equal facility, to the activities of the highest organisms, including man himself. Plainly, therefore, its applicability to the lowest organisms cannot be urged as evidence that such organisms are destitute of psychical accompaniments to these mechanical responses.

Pray let us have this point clearly stated. Imagine yourself, with first-hand knowledge of your own consciousness alone, placed in judgment upon (1) a man, (2) a leucocyte from that man's blood—the two being placed side by side. Imagine a disagreeable stimulus, as by the point of a pin,[1]

[1] It would need some art to "pink" a leucocyte with a pin, but that is immaterial.

applied to each in turn. Each withdraws—exhibits a "negative tropism." From the conduct of the man you infer that he *felt* the pin; why not draw a similar inference from the conduct of the leucocyte? If you refuse to draw it, subject each to a whiff of chloroform, and explain the failure to respond. What is the difference between the irresponsive and the responsive leucocyte, save that one is irritable and the other is not? Examine, then, your concept of irritability, this fundamental characteristic of living protoplasm. Do not be content with a good mouthful of a word; attach an idea to it; say whether from that idea you can exclude the notion of sentiency. Assuredly you cannot.

The main champion of the theory or rather the language of tropisms is Professor Loeb, of California. His teaching as to the gradual emergence of consciousness from such merely mechanical tropisms, is, of course, a reassertion of the doctrine first held by the founder of the evolutionary psychology. Spencer taught that the behaviour of the lowest forms of life is without psychical elements, and that consciousness appeared when the organism and its functions became more complicated and required the activity of some presiding genius. Fifty years ago, and less, we can readily understand the plausibility of such teaching as a tentative expression of the facts; but we have seen that the attempt to describe the simplest forms of conduct in mechanical terms by no means demonstrates the absence of psychical accompaniments or factors in such conduct. Further, we note that

whilst the Spencerian teaching may very well be true in so far as it concerns the evolution of consciousness anthropomorphically conceived—consciousness like yours or mine—we are compelled to seek and identify much simpler psychical states, of which consciousness, as we know it, is compounded. Having thus agreed upon a unit of consciousness or "irreducible psychical minimum," we find it impossible consistently to deny the occurrence of such psychical states, even in the simplest activities of the simplest forms of protoplasm with which we are acquainted. To assert that their occurrence may be denied simply because these activities may be described in mechanical language is idle; we might as well declare that their occurrence is demonstrated when we describe such activities in psychical language. Hence it might be demonstrated that Sirius is conscious, since the poet, remembering the universal sway of gravitation, has written that—

> "Thou canst not stir a flower
> Without troubling of a star."

Or, *per contra*, it might be asserted, in strict parallelism to the method of Loeb, that Truth has physical inertia, occupies space, and is subject to gravitational attraction, since Carlyle, in an early chapter of "Past and Present," has described the certainty of Truth's ultimate triumph in mechanical language.

It is affirmed, then, that in the last analysis of mind we must withdraw the proposition already laid down, that life is prior to mind. That is

doubtless true in so far as we mean mind as we know it; but if we reduce the psychical to its minimum, we must aver that life and mind are co-equal—co-extensive, and of common origin.

That Spencer himself came to recognise the inadequacy of his early teaching may be gathered from these lines on the last page of his "Autobiography" (the italics are mine):—

> No less inscrutable is this complex consciousness which has slowly evolved out of infantine vacuity—consciousness which, in other shapes, is manifested by animate beings at large—consciousness which, during the development of every creature, makes its appearance out of what seems unconscious matter; *suggesting the thought that consciousness in some rudimentary form is omnipresent.*

CHAPTER IV

THE EVOLUTION OF MIND (*continued*)

LEAVING the more philosophical aspects of a question which is manifestly of supreme importance to the seeker after Ultimate Truth, we may proceed to consider the main facts of the evolution of the mental and nervous apparatus in the animal kingdom.

We have already found cause to believe that, as Spencer was the first to maintain, *function precedes structure*, a general biological fact of wide significance. If structure preceded function, we should take up the tale only when animal organisation was sufficiently advanced to present definite evidence of

a *nervous system;* and we should be precluded from any allusion to the vegetable kingdom in such a work as this, since no plant presents any signs whatever of the differentiation of any nervous structures.

But we have seen cause to attribute the elements of a psychical life to lowly organisms which present no signs of nervous structures, a fact which accords with the proposition that function precedes structure. We may, indeed, amplify the statement, and assert that function tends to condition structure, to be a cause of its evolution.

The primitive organism is a single cell, master, within its limits, of all trades. Within that cell are unquestionably performed the various functions which, in higher organisms, are delegated to special structures. The cell is mouth and stomach and ejectory apparatus. It performs the functions of digestion though it has no specialised alimentary structures; it breathes though it has neither nose nor lungs; it circulates its fluids through its parts though it has no heart or blood-vessels; it disposes of waste-products though it has no kidneys; it responds to the stimuli of its environment though it has no nervous system, no organs of sense, no muscles to cause the desired motions. Within its limits, it is competent for "complete living." This is true, whether the single cell be animal or vegetable; whether it be destined always to remain single; or whether it is about to multiply and specialise until at last it attains complete development in the human "form divine." If it be the fact that the single-celled amœba or bacterium is able to discharge such various

functions, it is the much more amazing fact that the single cell destined to body forth a Shakespeare is also capable, whilst still single, of discharging all these functions. It would be a pleasant task, whilst describing the racial evolution of the nervous system, to compare it with individual evolution, and to show the significant parallelism between "phylogeny" and "ontogeny"—to quote the valuable terms introduced by Haeckel. But this would occupy too much space here, and I must content myself with reconstructing — very schematically—the past history of the nervous system in accordance with the *data* afforded us by the comparative study of the animal kingdom as we know it to-day.

The unicellular organism is succeeded by a multicellular; and this, in its first typical form, consists of two definite layers, an internal and an external. Now, life, as Spencer defined it, is a "continuous adjustment of internal to external relations." If we, then, consider the typical two-layered organism, whose structure was first demonstrated by Huxley, we shall expect to find that the external layer, in virtue of its position, discharges the sensory functions. In other words, the first sensory organ is the exterior of the body—the skin, so to speak. Now, remembering the recapitulation theory, we shall not be surprised to learn that the human embryo presents a definite two-layered stage. Whether in the hydra or the human embryo, we call these layers the *epiblast* and *hypoblast*.[1]

[1] These terms are more general, and therefore better, than ectoderm and entoderm—"without-skin" and "within-skin."

Now, what is the kind of sensation that we may attribute to this epiblast, whether in the one case or the other? It will not do, I think, to accept the phrase used in Tyndall's "Belfast Address"—"a kind of tactual sense"—simply because the adjective is too limited. Twenty-three centuries ago Democritus regarded a simple sense of touch as the progenitor of all the senses; but, in the light of the physical knowledge of to-day, I think we should attempt to improve upon such a definition. The lowest organisms respond not merely to mechanical pressure—with which we associate the sense of touch. The primitive sense is not only tactile, but chemical. It is more, for it may include the power of response to wave motions in air or ether, sound or light. The primitive sense surely contains in embryo, not only touch, but smell, taste, hearing, and vision. If we seek, in accordance with modern physical knowledge, to find a common term for all the stimuli—from the mechanical or material to the ethereal—which may excite the primitive sense, we are compelled to use the generalised term energy, of which matter and light—to choose extremes—are alike the manifestations. Failing a better term, I would rather, then, call this primitive sense, which determines response to so many forms of energy that may impinge upon the organism, the *energy-sense*. This, I think, is more accurate than "a kind of tactual sense," since it is hardly satisfactory to refer the appreciation of light, for instance, to a kind of touch. It has recently been proved, indeed, both by mathematical inference (Clerk Maxwell) and actual experiment (Nicholls and Lebedew), that

light exercises a *pressure*, now known as radiation-pressure, and I have elsewhere suggested that vision may possibly be referable to this pressure, and may thus be, indeed, a kind of touch—a conclusion which is in accordance with the language already quoted; but I prefer, for the sake of precision, to term the primitive sense an *energy-sense*, since this term foreshadows all the possibilities of the specialised senses evolved therefrom. We conceive the epiblast, then, of the hydra, or of the two-layered human embryo, as appreciating the presence without it, or the impact upon it, of an indefinite number of forms of energy. Further, we may assume that, since an organism is an organism, and not an aggregate, the changes produced by the energetic environment in the epiblast will secondarily affect the hypoblast—even at this stage, before the development of any communicating nerves.[1]

[1] This point, the possibility of one part of an organism affecting another without nervous communication, is well worth noting. Recent investigations have proved that the conception of the highly organised body of a man or a dog, as consisting of a number of independent organs unified and brought into relation *only* by the intervention of the nervous system, is not wholly true. We have discovered that the circulation of the body-fluids is a unifying factor independent of the nervous system. Various chemical substances have been isolated, which are now known to be produced by various organs during the discharge of their functions, and are then passed on to other organs, serving to stimulate them. The complex series of processes which we call digestion are thus, though largely independent of the nervous system, correlated and unified. The pancreas, for instance, produces an obvious digestive secretion which passes through a duct and is poured into the bowel; but it also produces an "internal secretion" which is absorbed by the blood circulating through the pancreas, and is carried by it to other organs, which it stimulates to the production of further digestive secretions, which complete the work initiated by the

If we confine ourselves to the hydra, there is no more to say of its epiblast. But there is a fact of the first importance to note concerning the external layer of cells of the two-layered human embryo. What are the structures which that external layer is destined to produce? One of them is, very naturally, the skin. The external layer of the embryo gives rise to the external layers of the adult; and it is proper to conceive the skin as the primitive sensory organ, the primitive organ for receiving external stimuli—this plainly in virtue of its position. But the human skin, if its sensory nerves be destroyed or divided, is entirely insentient. The seat of sentiency is the central nervous system. Now, the remarkable fact is that the central nervous system is entirely developed *from the primitive skin*, *i.e.* from the epiblastic layer of the two-layered embryo. Let us briefly note how this occurs.

In the course of human development, the primitive epiblast, along a certain line which corresponds to the long axis of the future body, undergoes an infolding. There is thus formed a longitudinal groove, lined by epiblastic cells. In the course of time this groove is roofed in and converted into a closed canal, completely lined by epiblastic cells, *i.e.* by cells from what we may call the primitive skin.[1] Now, the cells that line this

pancreatic juice. These recently discovered facts I regard as relevant to our subject, for they help us to understand the manner in which an organism, not possessed of nervous connections, may respond, as a whole, to its environment, even though only its external surface is stimulated.

[1] The word skin is used for descriptive purposes. Of course, the adult skin is a highly complex structure.

neural canal are destined to produce the *central nervous system*, which, as we may remember, is a structure that lies in the long axis of the body. From the cells of this central nervous system—brain and spinal cord—there pass out processes or elongated portions of their substance, which we call *nerves*, and it is the first concern, so to speak, of many of these nerves to pass outwards to the skin—to re-establish relations with what remains superficial of the original superficial layer, from which the adult skin and the adult nervous system are alike derived. The original division of the epiblast, into the portion that remains superficial and forms the skin, and the portion that becomes buried and forms the entire nervous system, is expressed by using the terms *cutaneous epiblast* and *nerve epiblast*. If we look broadly at these facts we see that the brain of man is derived, both "phylogenetically" and "ontogenetically"—both in racial and in individual evolution—from the surface of the body, that is to say, from the part of the body which is in immediate relation with the environment. Thus we may be justified in asserting that not only life, but also mind, when considered in the light of the history of the nervous structures with which it is related, is a matter of the "continuous adjustment of internal to external relations." Hence we have an embryological and evolutionary proof of the truth of the idea, precious to the poet and the philosopher, that the true aim of man—*i.e.* of man's mind—is to reach harmony with Nature. The brain of man is a specialised and secluded portion of the surface of his body, that is to say, of the part of

his body which is nearest to the rest of Nature. To me this truth is not bizarre, but deeply impressive.

One special illustration may fitly be introduced here, as it will serve to show the essential relation of the nervous system to the external layer of the animal organism, whether embryonic or adult. There is no more remarkable organ in the body than the eye, the end organ of the visual sense.[1] The action of light on the simplest organisms is little more than an influence upon the chemistry of the superficial cells. But as specialisation proceeds, certain skin cells develop a pigment which, like the pigment in the retina of the eyes with which you now read, is capable of rapid chemical change under the influence of light. In these sensitive pigment cells the eye is incipient. Now, it is the embryological fact that the eye of all invertebrate animals that possess eyes is developed from the skin, *i.e.* from the cutaneous epiblast. In this respect the vertebrates show an important point of distinction, for the essential parts of the vertebrate eye are developed from the brain, which sends forth from itself a sort of stalked bulb, the stalk becoming the optic nerve and the bulb the retina, &c., of the eye, whilst the less important parts of the organ are derived from the cutaneous epiblast. But in every case the eye is derived entirely from the primitive epiblastic layer, though the vastly superior eyes of the vertebrates differ

[1] Darwin somewhere remarks that he could never think of the eye without a cold shudder, so incredible at first sight seemed the evolution of such an organ by Natural Selection.

from lower eyes in being formed mainly of nerve epiblast, only the less important parts being derived from the cutaneous epiblast.

Having attempted to extract all their significance from the two-layered animals and the two-layered embryonic stage of the higher animals, we may pass on to consider the very simplest form of nervous system. The next stage in evolution is the development, between the two primitive layers, of a third—the mesoblast; and perhaps the most characteristic structure to which this gives rise is the *muscular system*. Now, the muscles, from the standpoint of psychology, are appendages of the nervous system; they are the "end organs" of motor nerves. Just as a sensory nerve conveys impulses from a sense organ, such as skin or eye, so a motor nerve conveys impulses to a muscle. It is this conception of the nervous system which apparently justifies the definition of psychology as the "science of conduct," since all conduct appears to include muscular movements. But there are no muscular movements in the internal direction of a train of thought, though such direction is surely a part of conduct; and, on the other hand, a train of thought may be independent of direction by the will, and it is again, impossible to include the fact of a dream under a science of conduct, though dreams are certainly subject-matter for psychology.

Hence we do not accept this definition; but we, nevertheless, must attach great importance to this idea of the muscular apparatus as a mere appendage or servant of the nervous system. So soon as

we find a nervous system we find a muscular apparatus.

The very simplest nervous system, such as that of the jelly-fish, possesses no differentiation of the nerves as sensory and motor. The nerve fibres run directly from the sensitive cells of the epiblast or external layer to the muscle cells—every muscle fibre is a living cell. Now, a nerve fibre is always a mere process or linear prolongation of a nerve cell, and in this very simple case the sensory cell of the surface of the body *is* the nerve cell. It receives a stimulus from some form of energy—light, or a stone, or what not—external to the organism, and a nervous impulse travels directly through the nerve fibre to the muscle, which thereupon contracts. Hence this nerve fibre is both sensory and motor. This fact is worthy of note in relation to the question of the nature of a nervous impulse, for it teaches us that though, in the higher organisms, there is a sharp distinction between sensory and motor nerves, yet the function of each is really the same, viz. to act as a channel of energy.

In the simplest possible case the energy travels, so to speak, directly from the surface to the muscle. But there is no real distinction in the case of the new complexity that arises when the *sensori-motor arc* is divided into two portions by the interposition of a nerve cell on its course. For though there would appear to be a fundamental distinction between the nature of the sensory impulse that travels to the nerve cell from the sensory organ and the surface, and the nature of the motor

impulse that travels from the nerve cell to muscle, yet our knowledge of the evolution of the mechanism leads to the conclusion, otherwise abundantly supported, that the nerve cell is merely the transformer of the energy that reaches it from the surface, and is transmitted by it, in altered form, to the muscle.

Such a sensori-motor arc as we have described is "the fundamental type of all nervous action, and it would seem that the nervous system of any one of the higher animals, even of man himself, consists essentially of such sensori-motor arcs conducting nervous impulses from the sense organs to the muscles."[1]

Let us now, very rapidly, glance at the outline history of the course which has been followed by the nervous system in its evolution from the primitive form to that which we find in the vertebrates and their youngest scion, man.

Even in man, and notably in the arrangement of his nervous system, we find signs of the *segmented* character of his remote ancestors. Each segment of a worm is much like all the rest, containing, amongst other structures, a simple nervous mechanism. The vertebrates, which must probably own to a worm ancestry, show the latent possibilities of combination and development possessed by a line of such simple nervous mechanisms. Plainly, each segment of the worm must become co-ordinated with the rest. Hence a number of nerve fibres are formed which run longitudinally, bringing the

[1] I quote from the excellent little "Physiological Psychology" of Mr. Macdougall. (J. M. Dent & Co., 1905.)

nervous structures of all the segments into relation. As evolution proceeds, the organism discovers it advantageous to arrange its sensory organs more especially about the end of its body which is in the van. Man's erect attitude, a late development, has thus obscured the causes which determined the special nervous importance of the anterior end of the body.

If we examine the nervous system of adult man, we find that it lends itself to treatment as, essentially, a segmented structure. The physician, concerned simply with the study of nervous disorders, and quite careless of evolutionary theory, finds it convenient constantly to speak of "spinal segments." Indeed, the fundamentally segmented character of the spinal cord, so significant in relation to the genealogy of man, is ever being found of more and more importance to the physician. Quite recently, Dr. Head, a distinguished neurologist, has shown how the surface of the body may be divided into sharply marked areas, each of which is definitely related to a spinal segment; whilst the same segment is as definitely related to certain internal organs. Hence disturbance of a given organ is apt to be reflected in pain, which is referred not to the organ itself, but to the area of skin which is supplied *by the same spinal segment.* Head's doctrine of "referred pains" and his explanation of their origin, marks one of the most important practical and theoretical advances in recent clinical medicine. The whole body has been most carefully mapped out, so that, by the aid of his reference library and its diagrams, the physician is able to observe the

body of his patient and infer the true seat of pains of which the patient complains with almost as much readiness as if the human body were still a simple series of segments, like the body of the worm. Head's teaching seems almost too simple and precise to be true of a structure so apparently complex as the human body, but it stands all investigation. Even where the patient, suffering from gastric disorder, for instance, does not actually suffer from "pain in the back," or where the pain does not "go through to the back," yet it will be found that when the area of dorsal skin which is supplied by the same spinal segment as the stomach is gently stroked with the point of a pencil, it is far more sensitive than the surrounding areas.

Nor need we imagine that the essentially segmented character of the human nervous system is purely a matter of inference. On the contrary, it is a matter of mere anatomical observation. Between each two vertebræ there emerges, on each side, a nerve which proceeds from the corresponding spinal segment, and the origin of which, in the nerve cells of that segment, can be definitely traced.

But the great feature of the nervous system of man is the enormous development of the longitudinal fibres which connect one segment with another; and the analogous and even more remarkable development in the brain of the *association fibres*, by means of which every function, or rather the nerve centre that controls or exercises every function, is brought into intimate relation

with all other centres. Nothing would be more instructive than to compare the scant and slender fibres which connect the various segments of the worm with the abundant and complex arrangement of fibres which serve a similar purpose in man.

There remain for consideration three points, ere we bring to a close this brief and most imperfect review of the evolution not so much of mind as of its material organs.

The first is as to the *protection* of the highly developed nervous system of the vertebrates. If we are to ask the cause of the withdrawal from the bodily surface of that portion of the primitive epiblast which is to form the central nervous system, it is evident that it is to be sought in the protection which is thereby obtained—a protection for which the great complexity of the arrangements by which relations with the surface are re-established, is a small price to pay. Obviously the objection to wearing one's heart on one's sleeve, or one's brain on one's exterior, is the danger to which it would be exposed. Otherwise, the surface is the natural place, since the nervous system, and all the mental powers and attributes of man—including those typified by the word heart in the familiar phrase—are of use to him precisely in the adjustment of internal to *external* relations. Now, in the vertebrates the essential and irreplaceable parts of the nervous system are withdrawn, as we have seen. And, whilst one great function of the mesoblast is the formation of the muscles which are the servants of the nervous system, its other chief function is the formation of the skeleton.

Now, the bones are of value as a framework for the body and as points of attachment for muscles; but, from our point of view, this mesoblastic structure serves no more important purpose than that of protecting the central nervous system. Hence, in the typical vertebrate, we find that the central nervous system, though developed from the superficial layer of the embryo, is entirely enclosed within a rigid bony structure derived from the mesoblast. The brain and spinal cord have become completely enclosed in the cranium, or skull, and the spinal column, which are developed from a layer originally enclosed within the layer from which these nervous centres are developed.

But, plainly, the mere enclosure of these nervous structures within a bony tube would not suffice for their protection. Were there no other arrangements, every force applied to the spinal column or brain, every step in walking, would cause a violent jar to the nervous centres; and we happen to know that when such a jar occurs the nervous mechanism —so sensitive is it—is completely thrown out of gear. How, then, are the effects of concussion entirely averted, save in cases of the most violent incidence of external force?

The remarkable fact is that, whilst the central nervous system is completely enclosed within a bony box, yet the disadvantages which would otherwise necessarily accompany the obvious advantages of this arrangement are completely averted by the circumstance that the brain and spinal cord are separated, at all points, from the skull and vertebral column by a layer of mobile

fluid. "The brain rests upon a water-bed." Were it not so, the walking of a single step would doubtless cause the pedestrian to fall unconscious to the ground.[1]

The second and third points are of much greater importance to the psychologist. Granted that the nervous system is, structurally, a mere congeries of sensori-motor arcs belonging to various cranial and spinal segments, in what manner are these related? Are they all masters, or are some subordinates and others supreme? This we must consider; and, thereafter, the vastly important question as to the attainment of *unity*, so that this infinitely complex structure, in health, serves as the organ of a psychical unit, the Ego or Self.

First, as to the question of rule and service in the nervous system.

The profoundest student of this matter is a great living neurologist, Dr. Hughlings Jackson, who has been enabled thus to serve pyschology in virtue of his wide clinical acquaintance with disease. Dr. Jackson has shown that to the conception of segments, which is demonstrably true of the vertebrate nervous system, there may be added a most fruitful conception of *levels*. Of these we may distinguish three—a lower, an intermediate, and a higher; the lower being the oldest from the point of view of the evolutionist, the intermediate of more recent development in the history of the animal kingdom,

[1] Were it within the province of this book, I should like to describe the arrangements by which, for further safety, the foot is constructed as an elastic arch; and also to comment on the manner in which this provision is rendered useless by the more fashionable forms of foot-gear.

and the highest the last to be evolved. In consonance with this view of the relative antiquity of these levels, the neurologist finds that the lowest level is the most stable, the most constant and consistent in its working, whilst the highest is the most delicate, the most unstable, and infinitely the most complex. The psychologist, on the other hand, as might be expected, finds that whereas the lowest level is of relatively slight interest to him as a student of mind, and the intermediate level scarcely more so, his business lies mainly with the highest level—with whose activities, indeed, consciousness, as we usually understand the term, and *à fortiori* self-consciousness, are exclusively related.

The relation of these levels to one another is in general a relation of rule and service. The lowest level is a subordinate. In view of the functions which it subserves we may almost call it a menial. It does all the dirty work. The intermediate level exercises some measure of control over the lower. The highest level is the master of the whole.

This metaphorical language may be extended even further. We may say that the lowest level, though a menial, is a trusted menial. Indeed, it is a servant who has been so long in the family, and has, so to speak, well served so many generations that it is nowadays left to do its work without let or hindrance. Indeed, the master of the house not only finds it better not to worry this trusted servant with his orders, but finds that very little notice is taken of them when he does venture to express his opinions.

The lowest level consists of the sensori-motor

arcs of the spinal cord, and of the large nervous centres which lie at the base of the brain and are known as the basal ganglia. They are the foundation of the entire nervous system. Their business is with the more humble, the less evident, but the quite indispensable functions. They control the beating of the heart—with which it is as well that the master is not able to play any tricks—the size of the blood-vessels—the muscular walls of which are under nervous control—the act of respiration, many of the processes of secretion, the movements of the excretory organs, and so forth. But whilst most of these functions are served by involuntary muscles—muscles not now under the control of the "master"—from this lowest level there also proceed the motor nerves which pass to the "skeletal" or voluntary muscles. These so-called voluntary muscles are most commonly excited, not primarily from the lowest level, but only through that level from the nerve centres of the highest level. Nevertheless, whenever the control of the higher levels upon the lower is weakened, or when some drug, such as strychnine, artificially excites the nerve cells of the lowest level, the voluntary muscles may be, and often are, thrown into contraction without the influence of the will, or even in defiance of its most urgent efforts to control them.

The intermediate level is of much more interest to the psychologist than the lower, for it is concerned with sensory processes which enter into the sum of consciousness. In the lower vertebrates the intermediate level corresponds to all, or almost all, of the brain, save those basal ganglia already referred to.

But perhaps the most graphic manner in which to indicate the distinction between those areas of the brain that may be regarded as belonging to the intermediate level and those of the highest level, is briefly to look at what may be called the new phrenology.

The surgeons, the physiologists, and the neurologists have found that a large part of the area of the cerebrum or "great brain" may be mapped out in accordance with its functions. Here they map out a speech centre, there a vision centre, an auditory centre, a centre for the sense of touch, a "motor centre" that controls the movements of the voluntary muscles, and so forth. These all belong to the intermediate levels. But if we examine brains in an ascending series from the lowest vertebrates to man, we find an increasing proportion—first well-marked in the higher apes, but far more developed in man—of the cerebral surface which answers to no obvious purpose, serves no obvious function. These areas, the enormous development of which accounts for the fact that the brain of man weighs, relatively to his body, about six times as much as the brain of any existing ape, are often termed the *silent areas*. Their most striking development is in the frontal or forehead region of man's brain, but they are found here and there all over the cerebral surface. For some time physiologists interpreted their entire failure to allocate any precise function to these large areas to some defect in their methods or incompleteness in their observations. But now it is seen that the true explanation is much more satisfactory and significant. These silent areas are

those which make man man; or, in more precise language, they are the areas connected with the mental powers which are the distinguishing feature of man. Their silence is golden. They say nothing, but they "think a lot." These are the areas of the highest level, the most delicate and unstable, the youngest, the most superfluous to the organic or physical life, the all-important for the psychical life. They are the living-rooms of the "master" in my metaphor.

If we avoid metaphor, however, and examine these areas in the "dry light" of physiological psychology, we are able to allocate a certain function to them; and in this we are supported by the actual observed course of the fibres which run from the nerve cells of these silent areas—these areas whose silence has made human history and made it vocal. The physiological psychologist merely calls them the *association areas*. In them arise great tracts of nerve fibres which run between different parts of the brain, run between one side of the brain and the other—the cerebrum being an organ that exhibits bilateral symmetry—and "connect up" all the distant parts of the nervous system, as the "exchange" connects all the subscribers to a telephone service.

The sum of these silent areas and the fibres that take origin in them, or run to them from the various centres of the intermediate level, constitutes the latest evolutionary addition to the nervous system. They subserve the conscious life of man. They are the "phronema" of Haeckel. And as ontogeny is a recapitulation of phylogeny, they are the last to develop in the history of each individual.

The action of poisons or the action of diseases—which essentially consist, in the majority of cases, in the production of poisons—well illustrates the peculiar characters of this highest level of the nervous system. Thus, a small dose of opium, or alcohol, or the toxin of diphtheria, may affect the action of the highest level, may disturb the power of thought, the power of self-control—so important a function of the highest centres, the power of attention, the judgment, and the sense of self-respect. With larger doses the vital centres at the base of the brain, the most important constituents of the intermediate level, are affected, and the patient may die of respiratory failure, due to the action of the drug on the respiratory centre in the *bulb*—that part of the brain which leads into the spinal cord. This is the natural sequence. Drugs, on the other hand, which, in small doses, have no action on the higher level, but affect the lower levels, do not directly influence the higher level, in whatever doses they are administered. Thus, even a fatal dose of curara, which paralyses the terminations of motor nerves, leaves the consciousness intact; and the unfortunate patient who dies the ghastly death of strychnine poisoning retains his psychic faculties unimpaired until the spasm of his muscles, induced by the stimulant action of the drug on the centres of the lowest level, brings consciousness and life to an almost simultaneous end.

In further accord with this invaluable conception of Jackson's are many facts of senility and insanity. It is the highest level, the last to be evolved, and the most delicate, that is the

first to feel "the unimaginable touch of Time." The old man or the insane patient is often querulous and selfish—signs of loss of self-control—whilst his intellectual as well as his moral nature is impaired. Meanwhile, however, his intermediate and lower levels retain their old efficiency. Later, however, the intermediate level may show signs of impairment. Hallucinations of vision and hearing may occur; whilst the more complex of the functions—such as swallowing and speech—which are performed by this level, begin to be imperfectly executed.

But as the old man dies from above downwards, so the child develops from below upwards. It is the objective or physical fact that the association areas are the last, in individual as in racial development, to acquire structural completeness. With this the psychical facts are strictly parallel. The reflex functions of the baby, higher and lower, the movements of its evacuating organs and the movements of respiration, are early perfected; and its muscles can be efficiently stimulated through the direct agency of the lower level. Later the higher levels assert their dominance. The evacuating organs come under the control of the will; and the muscles are no longer left to the automatic control of the lower level, but this is supplemented and dominated by the control of the highest level. In the act of "going to sleep," similar illustration of this conception of levels may readily be found. It is the highest level that is most easily fatigued. The respiratory centres never sleep at all. As we fall asleep we lose the highest powers first—the power of attention most conspicuously. We constantly

lose the thread of our ideas. The mind flits from one subject to another, mastering none. At last the ordinary consciousness vanishes: the highest level is asleep. But the subconsciousness sleeps lightly or not at all. If it sleeps lightly it may disturb us with dreams. We do well if the higher levels of the subconsciousness do indeed sleep. The lower levels never sleep. "The master" takes his rest, but his servants work all through the night in his behalf.

Finally, let us address ourselves to a most difficult and interesting question. Granted that the nervous system is an infinite complex of a countless number of arcs or units, how comes it that the organism is not incessantly at cross-purposes, divided against itself, drawn two ways at once, like the ass in the fable, and thus doomed to failure in all its enterprises? In the case of the primitive nervous system this problem can scarcely arise, for there is but a single arc to consider, but a single course along which impulses in response to external stimuli can flow. If this is perhaps scarcely true, even of the simplest nervous system which we know, yet it is nearly so. But what of the nervous system which consists of millions of such arcs, all interwoven and interconnected?

In order to answer this question we must make certain digressions. It cannot be answered without the prior discussion of certain matters which bear strictly upon the evolution of mind, indeed, but are perhaps more satisfactorily to be treated in another chapter. For we may observe that this great problem of psychical unity offers two aspects. The

problem of the unity of consciousness in general is one of these aspects; the other is the unity of the will. Of these the latter is the simpler, the older, in a sense, and its study will offer us in all probability the key to the former, which is a question of later interest, since self-consciousness is the last achievement of mind, and offers the most striking instance of this fact of psychical unity associated with a nervous system which is structurally multiple.

We proceed, then, to study the evolution of the will.

CHAPTER V

THE EVOLUTION OF WILL

ACCORDING to the first thinker who realised and proved that mind is an evolutionary product, the will is developed from reflex action. It will, therefore, be convenient, before setting forth the reasons which are in favour of Spencer's view, to consider what is meant by a reflex action, or, as one usually says, "a reflex."

The term is very loosely used. Finding that the definition first given me in a class of physiology is by no means generally accepted, I have attempted to discover a consensus of practice in its use; but I almost doubt whether such exists. I was taught to distinguish between three types of action—*reflex, sensori-motor, voluntary.* In the first, there is no sensation: an instance is the movement of the intestinal canal when food-stuffs enter it. In the second, there is sensation but no

volition: an instance being the involuntary act of winking at the approach of a dangerous object. The third needs no further definition. Now this classification is convenient enough for purposes of human physiology, but it is of no use, I fancy, to the evolutionary psychologist. For we are already convinced that, if indeed there be life without sensation, or response without sensation, we are unable to indicate the point at which sensation arises. We incline to the view that life and sentiency are co-extensive; that where there is no sentiency there is death. And if we take the instance I have quoted, we cannot divest ourselves of the conviction that the nerve cells in the walls of the bowel do in some measure *feel* the food that passes near them; that if they were not aware of it, they would not respond. Our broad consideration of the relations of mind and life leads us, then, to deny that there are any reflexes that answer to the definition I have quoted—reflexes where no sentiency is concerned. Movements that are unrelated to all sentiency, we incline to say, must be movements such as that of one billiard-ball struck by another — not movements of vital response. True it is that a man is not conscious of the contact of his partially digested food with the walls of his intestine; but, though *he* is unaware of them, the humble nerve cells of the intestinal wall must be aware. I propose, therefore, to draw no such sharp distinction between a reflex and a sensori-motor act. I believe that all reflexes are, in the last analysis, *sensation-reflexes*: intestinal movements and winking alike; and I

will distinguish merely between sensation-reflexes and voluntary acts. In how far even this distinction is always valid we shall subsequently inquire.

Let us then imagine the case of an exceedingly simple nervous system—not the most ideally simple, however, which would consist of one muscle cell and one connecting nerve fibre, but one which consists of a few such units. If now we observe the psychical outcome of such a nervous system, we find that it consists of processes which differ radically from physical processes in being *not* successive and simultaneous but successive only. If we apply this distinction, first pointed out by Spencer, to ourselves, we find that it is not perfectly true. You may remember Oliver Wendell Holmes's account of the professor who conducted a trivial conversation with a trivial woman, meanwhile asking himself how much longer she was going to keep him, or wondering why she could not see that he was in a hurry; whilst at the same time he had a third psychic level which kept saying to him with "damnable iteration," "You'll be late for lecture—late for lecture."[1] The truth is, of course, that the lady was not sufficiently interesting. Given "the time and the place and the loved one all together," the professor's lecture would have slipped clean out of his mind. As a rule, then, even in our infinitely complex selves, the psychical processes are successive but not simultaneous. Granted then that this is the psychical fact, what is the physical or neural fact that corresponds to it? Let us return

[1] My wife, as a child, used to talk of her "front thoughts," "middle thoughts," and "back thoughts."

to the simple nervous system we have imagined. In the following simplified account of the facts I follow the lines of the teaching of Professor Sherrington of Manchester, to whom all psychologists should be deeply indebted for his many years of brilliant research in this direction.

Even in a very simple nervous system, and still more, of course, in a more complex, one given sensory or ingoing nerve, whilst more prone to convey a stimulus that shall pass outwards along a given motor nerve, may yet lead to the sending forth of a motor impulse along any motor nerve or any group of motor nerves in the body; or indeed, as in the case of general convulsions, along all of them. Professor Sherrington finds in the various types of nervous system that he has examined what he calls a *common path* which may be taken by nerve impulses coming from various sensory surfaces or organs. But he further finds an analogy to a telephone system. The common path, so to speak, or the common paths, are trunk lines, by means of which a subscriber in Eastbourne may communicate with another in Bradford. Meanwhile, however, other people who want to talk to Bradford from the south of England must wait. (I do not saddle Professor Sherrington with the onus of this metaphor, though, for all I remember, he may have used it.) Now, in the language of the exchange, we may say that the first subscriber blocks the line for the others. This is exactly what Professor Sherrington has proved to be true of reflexes in general. They inhibit one another. If one sensory or ingoing impulse gains possession

of the common path, the others must wait. If the subscriber in Eastbourne shouts fourteen, and another at Bournemouth shouts four, the subscriber at Bradford hears neither eighteen, the sum of the two figures, nor ten, their difference. He hears fourteen or four, one or the other. Thus for him the complex telephone system is a single arc, in his case a motor-sensory arc. Similarly the nervous system in health may be regarded, though structurally so complex, as functionally equivalent to a single sensori-motor arc. A striking illustration from Professor Sherrington will explain my purpose in introducing the imaginary subscribers who shout figures over the wires.

Suppose two objects simultaneously presented to the eye, but seen not by the centre of the retina, but by what children call "the eye-corner." Either of these objects, alone, would excite exactly such a reflex action as would swing the eye round so that the light from the object in question would impinge upon the "yellow spot," the most sensitive part of the retina. What, then, happens when two objects simultaneously attempt to gain the individual attention of the eye? If they lie to the right of the field of vision, and in a horizontal line, will the two stimuli be *summated*, so that the eye swings round nearly twice as far as it should, and thus obtains a good view of neither object? or will the eye respond to the difference between the two stimuli, with the result that it swings round too far for the clearest vision of the one object and not far enough for the clearest vision of the other? Neither of these undesirable events happens. One impulse or the other

gains complete control of the common path, to the entire exclusion of its rival, and the eye is fixed upon either one object or the other.

Ere we proceed with our discussion of the evolution of the will, which we have introduced by these considerations as to reflex action, we may note the possibility that Professor Sherrington has given us the key to the fact of *attention*, or, to use Wundt's term, apperception.

Attention is one of the most remarkable and important facts that psychology has to study, but it is proportionately recondite. That the subject is closely related to the facts of will is evident to any one who remembers an occasion when his attention began to wander and had to be recalled; and the relation is seen to be still more significant when we remember that the power of attention is apt to be weakest in persons who are weak willed. Indeed, it may be, and has been argued—by Wundt, for instance—that attention is essentially an act of will; and this contention is all the more plausible in the light of Sherrington's study of reflex action, which, as we have seen, Spencer regards as that from which voluntary action is derived. The value of Sherrington's work may be realised when we contrast his conclusions with the extremely inadequate suggestion that attention depends upon a local dilatation of the blood-vessels, and thus the supply of an exceptional measure of nutriment to some (unlocated) part of the brain.

When we attend to a voice or an object of vision to the exclusion of other things, what is it but the complete possession of the "common path" by the

sensory impulses excited by the object in question? In consequence of their control of the common path, these impulses are able to command all the muscles which subserve attention. For it must be remembered that there is a very definite motor or muscular factor in attention—a circumstance which consorts with our conception of it as closely allied to volition. For instance, you are enthralled by a Ternina singing Isolde's "Liebestod" at Covent Garden. In vain the "back-thoughts" say, "You'll be late for your train:" nor are you aware of the fact that the man next you is standing on your feet as well as his own. Ternina has exclusive use of the "common paths." And what is the motor aspect of this state of strained attention? (Observe the hint of muscular action in the common phrase.) Your ears are not cocked forward, I grant, though the necessary muscles are there. But, inside your skull two little muscles, the *tensores tympani*, are in contraction, each tightening the drum of one ear, so that the aerial vibrations which reach you may be reproduced in it with as little loss as possible. Many muscles of the skeleton are in contraction, so that your body may be kept rigid and may make no sound. So eager may you be that you even forget to breathe, or may hold your breath, the reflex excited by Ternina temporarily inhibiting even such a fundamental reflex as is involved in the act of respiration. Your eyes also are fixed, your pupils dilated, by muscular action, whilst other muscles may even push forward the eyeballs so that they seem to start out of your head. Meanwhile the sensory nerves of your spine may be excited, so that you feel "cold shivers down

your back," whilst the secretory nerves of your lachrymal glands may be violently stimulated. So complex is the combination of reflex actions which constitute your act of attention in this instance, even though the exciting impulse is only twofold —or even single—if you cannot see the stage, but can merely hear. In how far this complex motor act of attention is *voluntary*, and how far a sensation-reflex, who shall say; but it is evident that the explanation of Sherrington is infinitely more satisfactory than such an old explanation of attention as I have quoted. It is, indeed, the only explanation that covers all the facts, and is, I doubt not, the true explanation.

Having gone thus far, the reader does not require me to elaborate the theory of Spencer that will has been evolved from reflex action; indeed, that all acts of will are, at bottom, reflex actions. But we must note that this theory of the founder of the new psychology is not universally accepted. Of course it is not accepted by the academic psychologists;[1] but I mean that it is not accepted even by all the scientific psychologists. The chief dissenter is Wundt; and his argument is simply this, I take it, that in accordance with the theory of psycho-physical parallelism, consciousness and not automatism is primary.

Let us seek to recognise the truth of both contentions. I have already advanced reasons for

[1] This refers, of course, merely to Great Britain. Wundt is an academic psychologist, but that is in Leipsic; so is James, but that is in Boston; so is Richet, but that is in Paris. Yet it might almost be said of psychology that it is a British science.

believing that sentiency—perhaps a less misleading term than consciousness in this connection—is co-extensive with life; and, if this be so, the original contention of Spencer cannot stand. So much we may grant to Wundt.

But, on the other hand, we must not fall into the error of automorphism already defined. Surely we must distinguish between the sentiency of an amœba and the consciousness of a man. If, then, we grant to Wundt the existence of conscious elements, or of a psychical life of sorts, indicated even in the movements of an amœba, and if we agree to regard as untenable the old definition of a reflex as one in which sentiency is not involved, we may yet agree with the contention of Spencer, after modification in accordance with these certainly important concessions. For there can be no doubt whatever that in the history of the race and the history of the individual, *what we mean* by conscious volition is a late development, that it was long preceded by reflex action (as we have now defined reflex action), and that it is possible to recognise the fundamental identity between such reflex action and those actions which, for us, result from the conscious, deliberate, provident (that is, fore-looking) exercise of the will.

The opponents of the Spencerian theory of the will lay much stress on the unquestioned fact that many actions once voluntary, whether in the racial or the individual history, are now reflex. Any one who has learnt to play cricket or the piano is perfectly familiar with the contrast between the neophyte's anxious volition as he attempts to control

the fingers of his left hand or to keep his bat straight when he "goes forward to a length ball," and the happy automatism with which he later performs the same feats whilst thinking of something else—whilst his conscious attention may be over the hills and far away. Now it has been argued that all reflex actions have followed this course: they were originally volitional but have subsequently become automatic. This argument, however, may be dismissed: first, because these facts were well known to Spencer, and are fully dealt with by him: and, secondly, because of the absolute incredibleness of the theory on examination.[1] Let us consider, for instance, the act of breathing, now essentially a reflex whose central nervous mechanism lies in a part of the lowest level of the nervous system. The most highly evolved animal, and he in whom the will is most highly developed, can control this process within certain limits which vary with different subjects. In the baby, on the other hand, there is no such volitional power: the respiratory function is purely reflex. That fact is significant enough; but let us consider the respiratory function in the lowest organisms. Before doing so, let us remember that plants breathe; but no one will suggest that this was once a voluntary act in their case. Consider, however, the simplest speck of protoplasm. Are we to believe that the interchange of gases between its naked surface and the surrounding atmosphere is a volitional act? On the contrary, it follows the mechanical laws of gaseous pressure: it is not yet

[1] It really implies that the will is an ancestral relic.

even a reflex. In the case of the cardinal function of respiration, then, we know for certain that it was primarily mechanical and no more, that later it came to depend on a reflex process; and that, in the highest organisms, whilst it is still a pure reflex, yet it may be modified by the will.[1] With the important modifications already noted, then, we must still believe that volitional is evolved from reflex action.

That the evolutionary conception of the will is certainly true no modern student can be found to deny; whether he inclines to accept the original form of this conception, or to modify it in accordance with the view I have discussed, that life and sentiency—life and mind—are co-extensive.

But the philosophic reader has already realised that this is no matter of mere abstract or academic interest, for it implies total rejection of what may be called the metaphysical theory of the will—whether we contemplate that theory in the form adopted by the theologians, or the forms accepted by the idealists, or even in the form given it by Schopenhauer who regarded "the world as will and idea."

The issue between the anti-scientific and the scientific or evolutionary conception of the will is, I think, a clear and definite one notwithstanding a thousand attempts to befog and obscure it. Assuming, for convenience, that we may speak of the will as an entity and not as a mere generalised aspect

[1] This argument, being my own, is advanced simply for what it may be worth.

of certain phenomena, we may say that both the evolutionist and his opponents regard the will as a cause. But whereas the "metaphysician" regards the will as a little first cause itself uncaused, the evolutionist regards it, like all other phenomena of this continuous universe, as not only a cause but an effect. Now if the will is itself an effect of causes which lie without it, are antecedent to it, are often antecedent to the very existence of the individual who displays it, then the will is not *free* in the sense in which that word is used in this connection. In other words, if the will is not only a cause but also an effect, then like all other effects it is determined. This doctrine of the will as a link in the infinite chain of cause and effect is known to the philosopher as determinism.

I do not propose to dispute this doctrine with those who deny it. As it is the only doctrine which is consistent with the tenour of this volume and of this series it may be left to stand or fall with the main contention of its context—which, I take it, is indeed no less than the sum of contemporary science—the contention that causation is universal.

But the doctrine must further be considered because of its importance in relation to our present purpose. The reader will remember that I am not attempting to discuss psychology from a detached standpoint. On the contrary, my purpose has been first of all to elucidate the main principles of modern biology as introductory to the study of mind in evolution, and to consider mind in evolution not out of intellectual curiosity, but because such a study is regarded as an indispensable preliminary

to the study of man as a social and moral being. Plainly, then, this doctrine of determinism, which occupies only a paragraph or two in the ordinary text-book of psychology, is of the very first importance to us. Indeed it may be said that the doctrine is an essential postulate of sociology. If the human will were at bottom incalculable, and if human conduct followed no principles, knew no laws, there could be no science of society, there could be no system of ethics. If the reader questions this, let him remember that even the crudest and most primitive system of ethics, which we may call the hell-fire morality, depends upon the very just assumption that the human will is not outside the realm of causation, that the tortures of the damned are not merely an object of detached moral contemplation, but are a "hangman's whip to haud the wretch in order."

It is highly necessary, then, that we make some attempt to classify or express in general terms the causes of human volition. Our comprehension of the historical evolution of will makes it plain that human conduct is determined in the first place by the inheritance of a particular type or rather a particular specimen of nervous system; and in the second place by the circumstances in which that nervous system has undergone development and continuance. In other words, human volition is determined, in the last analysis, by two factors and two alone—heredity and environment.[1] It is in this well-founded knowledge that we all, whether

[1] See the chapter on the relative importance of heredity and environment in the volume Heredity.

or not we profess to believe in the freedom of the will, pursue schemes of eugenics, or education, or social amelioration of any kind.

Proverbial philosophy tells us that human nature is the same in all ages. Science has proved this assertion to be totally, grossly, and patently untrue. For our purposes as men and women who have to face the problems of life, "human nature" may be paraphrased as the nature of human volition or human conduct. That is indeed what we mean when we speak of human nature. Now the assertion of science is that human volition is determined by, and, *à fortiori*, is modifiable by, heredity and environment. Human nature, therefore, is not the same in all ages, in the first place because of the biological fact known as variation, and in the second place because of the never-ceasing change of human environment.

Here we may perhaps note a kind of complementary or cumulative action of heredity and environment in the determining of human conduct—a fact which counts for the extraordinary rapidity, relatively, of human evolution. The environment of all living things certainly undergoes slow change: the sun is cooling, the earth is shrinking, and so forth. But it is the characteristic of man that he reacts upon his environment—moulds it as it moulds him. Man indeed is realising in some measure the wish of the Persian lover—

> Ah Love! could thou and I with fate conspire
> To grasp this sorry Scheme of Things entire,
> Would we not shatter it to bits, and then
> Re-mould it nearer to the Heart's Desire.

Hence we of to-day in our volitions are partly determined by the volitions of our ancestors, whose conduct has profoundly modified the environment into which we are born. This generalisation is obviously as true in the realm of ideas as in the realm of motor-cars or the like. Let any thinking reader, for instance, consider the effect upon his own life of that intellectual environment which nowadays compels us all, if we think at all, to "think in evolution," and which is a product of the volitional adaptation of one master-mind to the intellectual and material environment of *its* time.

CHAPTER VI

THE EMOTIONS

In this book we are paying relatively scant attention to the intellectual nature of man. Though we have dealt with the origin of sensation, we have said little of the formation of percepts and concepts, little of the rational processes. Our concern has been not to lead up to a text-book on logic, but to the consideration of conduct. For the present we are interested rather in what man does than in the manner of his thinking. Hence we have spent much time upon the evolution of man's psychical nature in general—regarded rather as sentiency than as a means of ratiocination or reasoning processes; and in especial we have considered the evolution of his volitional nature.

Strictly cognate to these questions is the subject

of the emotions. Now it has been shown that it is necessary to treat the emotions, also, from the evolutionary standpoint. It is evident that we know nothing, directly, of the emotions of the lower animals; it is equally evident, though by no means generally realised, that we know nothing directly of any emotions save our own. In the first place we shall consider the emotions objectively; or rather we shall consider that sequence of events in other human beings or the lower animals which, when they occur in ourselves, we know to be accompanied by a peculiar state of consciousness which we call emotion; and thereafter we may inquire as to the essential nature of that emotional state.

It used to be said that whilst man has reason, the lower animals have only instinct. Nowadays we recognise that assertion as merely an expression of pre-evolutionary ignorance. There is no such distinction between man and the lower animals. The best students of the "dumb creation," and the most competent psychologists, are agreed that rational processes of a simple nature—processes implying memory and the association of ideas—do occur in the lower animals; whilst man has instinct. But what is an instinct? Are we not wandering from our subject, which is emotion?

Instinct, or rather instinctive action, said Spencer, is "compound reflex action." We are now in a position to regard that assertion as practically self-evident. Now the conception which we commonly include in our idea of an instinctive action, is of an action which is independent of experience: yet it serves the purpose of the animal that exhibits it, as

well as if its expediency had been determined by a logical process of inference from experience. This subject will be further discussed in the chapter on the origin of our ideas. Meanwhile we merely note that each individual animal is *somehow* possessed of a nervous organisation which leads him—as we say, "instinctively"—to adopt a certain course in certain circumstances. One of Spencer's illustrations was "love's young dream," which comes upon a lad or a lass as a new and mysterious thing, utterly inexplicable by reference to his or her individual experience. The sexual passion is instinctive in man and the lower animals.

Now it appears that, as each of us knows certain of his own instinctive actions, such as falling in love, or running out of a dark room, to be accompanied by a peculiar state, of pain or pleasure or pain-pleasure; so he may infer that such instinctive actions on the part of his fellow human beings or the lower animals, are also accompanied by similar emotional states:—in other words, an emotion is the psychical accompaniment of an instinctive action or an impulse thereto.

And now we must inquire into the nature of that psychical state called emotion which accompanies instinct. This inquiry really resolves itself into the discussion of what is called the James-Lange theory of emotion, now more than twenty years old. Of this it may be noted in passing that though the majority of psychologists—perhaps I should rather say metaphysicians—are opposed to it, yet we look to them in vain for any constructive criticism on this matter.

It is now well recognised that there is, besides the sensation derived through the familiar sense organs, a vast mass of sensation which has its origin in the interior of the body, and which is commonly called internal or organic sensation. Now the James-Lange theory of emotion may thus be defined: the state of consciousness which we call emotion consists in a perception, as a united whole, of the sum of organic sensations which are aroused by the internal changes produced reflexly by the object or cause of our emotion. It is not quite accurate to say with Dr. Ward, "Professor James' main position is that an emotion is but a sum of organic sensations," for emotion has a certain unity for its subject; it has the character of a percept, just as your consciousness of a friend is by no means the mere sum of sensations aroused by his voice and the light from different portions of his person, but is a single percept in which all these are unified.

Obviously the James-Lange theory has certain interesting implications—implications which are entirely in accordance with our understanding of reflex action, instinct, and volition, as seen in the light of the evolutionary psychology. For it implies a certain criticism of the ordinary statement that, for instance, we cry *because* we are sorry or tremble *because* we are afraid. According to this theory the crying and the trembling are instinctive, that is to say, they are compound reflexes dependent on no psychical state, save such as is implied in all reflexes; and the emotion of sorrow or the emotion of fear is merely an accompaniment of the physical changes which are implied in the act of crying or the act of trembling.

It has been attempted by Professor Sherrington to put this theory to an experimental test, and his results appear to be by no means incompatible with the theory, but actually parallel to the cases cited by James, where organic anæsthesia in the insane was accompanied by absence of emotion. In such cases "emotion-inspiring objects may evoke the usual bodily expression," though the emotion is not felt, owing to a morbid state of the nerves that usually convey organic sensations, or of the centres to which those nerves run. Now Sherrington found that, after the performance of an operation which prevented impulses of internal origin from reaching the brain, dogs still exhibited the symptoms of emotion when their instincts were excited. Of these experiments Dr. Ward actually says "these show conclusively that normal emotional states *are* possible along with complete visceral anæsthesia." Either Dr. Ward uses the word emotion in two senses—in which case his argument is not worth considering; or he assumes that, because such dogs display the instinctive response, *therefore* they experience the emotion. But of this, Professor Sherrington's experiments offer no proof whatever.

On the whole, then, we may take it that the James-Lange theory, supported by a host of facts and contradicted by none, and in strict accord with the principles of the evolutionary psychology, may be accepted as true. The objectors, if they are to be listened to at all, must either adduce facts incompatible with the theory, or they must deny that emotions are correlated with any physical or neural states whatever; or they must suggest some other

neural state than that which the theory asserts to be the physical correlate of emotion. In the absence of any successful attempt to fulfil these requirements they may be ignored.

This chapter cannot be closed without a reference to the higher states of emotion excited by art or by religious ideas. Plainly we cannot off-hand declare that these also are instinctive, without reminding ourselves that this term merely implies the origin of such states to lie not in reasoning or the intellectual faculty, but in the reaction of the organism to certain stimuli: such reaction being best described not as instinctive but as inherent or intuitive—or by any word which suggests that such emotions are really an expression of the particular temperament or arrangement of interrelated reflexes of the individual who exhibits the emotion. And this leads me to consider the relation of emotional states to our intellectual concepts, and especially the concept of *Truth*, as an immutable reality which is independent of anything that may be thought or felt about it.

According to the usual classification, our modes of consciousness may be either sensations, perceptions, conceptions, or emotions. The concern of what Baumgarten called æsthetics is with the last of these. Now all facts are part of Truth, including such facts as that a picture or a song affects one in a certain way—excites a certain state of emotion. But the great concept of Truth is of an order of facts which is independent of the percipient, or is, as we say, objectively true. Like all concepts, this is intellectual, not emotional.

An emotion is a subjective and personal thing. It is your emotion or mine or some one else's; it necessarily implies a personal subject or possessor. The content of an emotion is true in the sense that all facts are true; and the subject of this emotion may exercise his distinctively human power of self-consciousness, and, by turning his attention upon himself, may introspectively recognise the fact of the occurrence of his emotion as an objective truth. But it behoves him carefully to distinguish. For instance, I may have the emotion of hate aroused in me by a certain man. It is a fact—and therefore part of truth—that I have that emotion; but, on the other hand, you love that man, and this emotion, which contradicts mine, is as true for you as mine is for me; whilst an impartial third may record your hate and my love as facts both objectively true. Now, if the Cosmos be a Cosmos, no fact in it contradicts any other. Nevertheless I shall be heard positively asserting that this man is hateful; and you, as positively, and with equal "reason," that he is lovable. Plainly we are both right, in that we speak of a fact we know, and none can know so well; but we are both wrong in that we imagine our knowledge to be a fact of the man in question, whereas it is not a fact about him at all, but about ourselves. I am apparently right in asserting him to be hateful, you in asserting him to be lovable; but plainly he cannot be both. In truth, he is hateful *to me*, and lovable *to you*: in other words, the content of my emotion is a fact about me, and the content of yours is a fact about you. Were we discussing our friend or enemy in a smoking-

room, we should agree that, in short, I hate him, and you love him. Whilst our emotions are precious beyond price, we must guard against imagining that their contents tell us anything about their *objects*. The fact that I hate the man is by no means necessarily damaging to him (I may be one of those described by Milton, "by whom to be dispraised were no small praise"), but may be most damaging to me; whilst the fact that you love him is by no means necessarily laudatory of him, but may be the worst thing that could be said about you.

This, like so many of the important things, is all quite obvious, and, even though we have never met it formally stated on paper in the "jargon of psychology," we may safely say that we always knew it. But we have a way of hiding this our light under a bushel. We do not always talk as if we were aware that our emotions are facts of ourselves and not of their objects. Perhaps I hear a song by Schubert—or Stephen Adams—and say "That is a good song." Now I might conceivably be entitled to say so. I might have made so profound a study of æsthetics in general and of the æsthetics of song-writing in particular, and I might have so much power of exposition as to be able to "prove" that it is a good song. But, in point of fact, I certainly cannot, having, to begin with, very vague notions as to the validity of the criteria in any such attempted "proof." Not having these qualifications, I am entirely unwarranted in making any assertion about the merit of the song; and am warranted merely in saying, "That song excites pleasurable emotion in me," or, in the vernacular, "I like that song." This

manner of speech may sound very egoistical, as compared with "That is a good song," but it really is by far the more modest of the two. For if some one should ask why I call the song good, I should be forced to reply that I say so because I like it; whereupon it will appear that my assertion as to the goodness of the song contained a further (implicit) assertion as to the goodness of my taste in songs. I like it; *ergo*, it is good! Similarly, I hate you; *ergo*, you are hateful! The grossness of the error is obvious, but we all commit it, imagining assertions about ourselves to be assertions about something or some one else. In this matter the philosophic discrimination is with the author of the lines on Dr. Fell. He clearly understood that he was making an assertion not about the doctor but about himself.

The application of all this to the art-criticism one daily reads is evident enough. In so far as a work of art is open to the judgment of the intellect —as the remote derivation of the word art shows it must always be—the critic may be justified in pronouncing it to be good or bad; that is, objectively good or bad. But the structure or form of any work of art, being ultimately reducible by a perfect intellect to a series of mathematical expressions, is not the vital, the truly artistic thing; else the bowels of a motor-car are a work of art. The vital thing is precisely that upon which no critic, in the present state of our knowledge, can express an opinion. He *can* express, however, what is much more than an opinion; he can tell us how the thing affected him, and that is not a matter of

opinion, but of the most certain knowledge accessible to the human mind. That way lies safety; for the "feeling-tone of sensation" is affected by many things: the weather, the digestion, repetition, more repetition, and so forth. Hence the critic who said "That is a good opera" on one occasion may wish he had not said so on the next, when he finds it deadly dull. If, however, he be a psychologist, as every good critic is, he will merely have said on the first occasion, "I like it;" and on the next he is free to say, "This time I do not like it." Whereat the groundlings, but not the judicious, will grieve.

When we realise the precise importance of the emotional nature of the "æsthete" (there is no other generic word), we are able to understand, without the usual amazement, the diversity of opinion. Wordsworth saw nothing in Keats; Wagner and Brahms thought each other's music worthless; but, on our theory, they were very foolish to say so, for what they thought to be assertions about each other's music were really assertions about themselves. And the curious thing is that we, who could not have written a bar of either's music, can respond to the emotional appeal of both.

One more point. We "dry-light-of-reason" students maintain that men can always express their knowledge in words. This the amateur of art is apt to deny: he hears the so-called "Moonlight" Sonata, or sees a Rembrandt, and says, "I know that is good, but I cannot tell you why." To which I answer, he knows nothing of the sort. What he knows is that the music or the picture

deeply affects him. It is knowledge of his own emotions, and that is why he cannot give a reason for it. I do not believe that there is any rational knowledge which cannot be expressed in words. No student of psychology believes it. Thoughts too deep for speech are not thoughts at all, but emotions. Far be it from me to decry them; life would not be worth living without them, and indeed would not be life without them. The insane patient who experiences no emotions is alive only in the biological sense; but that is no reason why we should misuse language, and confound emotional with rational states of consciousness.

The reader will perceive that this question is of supreme philosophic importance: for the implication is more than merely that art-criticism is necessarily subjective. If emotional states have no validity as criteria of any facts of the not-self; if your "knowledge which words are too coarse to convey" is not knowledge but emotion, we must utilise these conclusions in attempting to learn from the mystics and the poets. If these things are so, Wordsworth's sublime ode is no more, philosophically, than a noble expression of what Clifford called "cosmic emotion" felt by a superlatively privileged boy; but if the contents of an emotion are to be accepted as having objective truth, then we must accept the pre-existence of the soul as proved, since an honest witness has been found who all but remembered "that imperial palace whence he came."

Concerning the importance of the emotions in

human life it is hardly necessary to speak; for no one can consider the subject without realising that it is incalculable. But if this be granted, we must apply our conclusion to our practice of education. Elsewhere I have written on the concept of education which is forced upon us by the consideration of the facts of organic evolution. Here it may be added that, if the emotional nature of man—or his instinctive nature—is as important as we think, we cannot neglect the education of the emotions in any complete pedagogic system. True it is that the emotional nature is given to each by inheritance, for better or for worse. But we have already seen that the environment always has the last word: that heredity provides nothing but potentialities. Hence we are permitted to infer, as indeed we have daily occasion to observe, that education or environment is potent in moulding the emotional nature—in determining the nature of instinctive acts, so that the child may acquire instincts which would otherwise never have been developed, and may allow instincts to lapse which, in another environment, would have had a large say in the control of his conduct. That the true function of education is character-making the wisest have at all times recognised; but sometimes one thinks that the fact needs constant re-assertion in these days when education is being more and more considered as merely a factor in individual or national finance. "Technical education" I believe to be a phrase so apt to mislead, so certainly entailing a degradation of a noble word, that I think we should persist in speaking rather of technical instruction, leaving the

word education to signify that schooling of the intellectual and the emotional nature which alone makes for "complete living."

CHAPTER VII

THE ASSOCIATION OF IDEAS

THOUGH it has been my deliberate intention to treat but incidentally of the intellectual nature of man, it is impossible to write such a text-book as this without devoting one chapter to an intellectual matter; and the subject I choose is the association of ideas: this because of its interest, its importance as the key to intellectual operations in general; and because it is a subject which can scarcely be ignored in any text-book written in the English language. The association of ideas was discovered by Hobbes, profoundly studied by Locke, and elevated to the first importance by the two Mills and by Bain. Thus the "British" and the "associationist" schools of psychology are almost synonymous terms.

Most of us made our first acquaintance with the principle of association of ideas when some senior volunteered to write down fifty nouns in a column, and then recite them from memory. Thus noun suggests school, school a particular master, his name the name of the place he occupied in the cricket-field, that Australia, Australia the Empire, the Empire fiscal reform, fiscal reform oratory, oratory Demosthenes, and so on without limit. The late Professor Alexander Bain of Aberdeen advanced

reasons for believing that the essential character of philosophic or intellectual genius—I use the adjectives to distinguish the genius of a Newton from that of a Velasquez—consists in the freedom and variety and range and fitness of the association of ideas; and his contention withstands all manner of criticism.

It used to be said that association of ideas acts by contiguity, simultaneity, similarity, and contrast. But this classification may be simplified. Contiguity in space—as when an old tune recalls the surroundings in which it was first heard; and simultaneity or contiguity in time—as when the memory of one occurrence arouses the memory of another that happened on the same day or during the same holiday—these are obviously reducible to the principle of *contiguity*—in space or time. Likewise similarity and contrast—the one being merely the negation of the other—are reducible to one principle. And ingenious efforts, more or less successful, have been made to reduce to one the two principles of contiguity and likeness or unlikeness.

But here I would especially refer to the association of ideas in relation to what we know of the physical or neural aspect of psychology. In the first place, the association of ideas implies memory or mental retention—a psychological subject on which a treatise might be written. Memory, of course, has two aspects: the retention of an idea, and the reproduction of it at will. Ideas may be retained though they are normally irreproducible; as is proved by cases where a sudden shock

in old age revives the memory of a language learnt in childhood and apparently forgotten for decades. Hence before considering the neural or physiological aspects of the association of ideas, we should properly attempt to elucidate the nature of the physical or neural changes which are implied in mental retention and in reproduction of what is retained. But this subject is so obscure that I propose to leave it untouched; and, having merely noted its existence, to pass on to the nature of the neural process which is implied in the association of an idea, new or old, with some other idea, already stored up—*somehow*—in the mind.

When discussing, in an earlier chapter, the outlines of the structure of the central nervous system, and the Jacksonian concept of *levels*, we saw that a great part of the brain—a part relatively much greater in man than in any other animal—consists of what are called "association areas" and "association tracts." It seems reasonable to assume that these structures are in some way related, physically, to the process which, under its psychical aspect, we call the association of ideas. That there is a physical explanation, could we obtain it, of the association of ideas, we cannot doubt for a moment. The notion of one idea calling up another directly is quite unintelligible: it is itself a pseudo-idea. We are compelled to believe that, with the calling up of an idea, there is a state of neural excitement which is, in some way, able so to diffuse itself, or so to stimulate other nervous structures as to give rise to, or be accompanied by, other ideas which are

related to the first in the manner we have seen. And the question is whether the association tracts offer us an easy and sufficient explanation of the process.

Hume, who knew nothing of what we nowadays call "cerebral localisation," suggested a mechanism which fits in well enough with our modern knowledge of association tracts. Stated in our language, Hume's notion is that when any given nerve cell is excited, an impulse passes along the nerve fibres which connect that cell with some other, and cause it to yield up its idea, as a bell yields up its note when it is struck. In spite of criticism, we may perhaps agree that this theory is as likely as any other to afford us an accurate symbol of the facts; but it needs certain criticisms.

The word idea is very loosely and widely used. In the phrase association of ideas it is used with the widest possible connotation. Thus the memory of the particular quality of a particular voice is an idea, and may recall a thousand circumstances connected in one way or another with the owner of that voice. It may suggest, for instance, the particular colour of the eyes that belonged to the owner of the voice. In such a case Hume's theory is fairly satisfying. For we can locate, with great precision, the auditory and the visual centres; and we can scarcely doubt that the memory of the vocal quality is dependent, in some way, upon certain changes in the auditory centre, and the memory of the eye-colour upon analogous changes in the visual centre. If, then, we trace the passage of a tract of nerve fibres from the temporal lobe to

the occipital lobe, we seem to be offered a fairly satisfactory explanation of the manner in which the memory of one simple idea arouses the memory of another.

But such a theory as has been outlined offers us little aid when we come to consider more complex yet equally familiar cases of the association of ideas. The idea, for instance, that absolute monarchy rests upon militarism may arouse the associated idea—associated because first heard on the same occasion—that many democracies are nevertheless militant. Here it becomes difficult to distinguish between "mere" association and a process of reasoning: a difficulty which is in accordance with Bain's view as to the essential nature of intellectual processes. But the present point for us is that, directly we consider such a case as this, the simple theory that was adequate in simple cases is no longer adequate or within any measurable distance of adequacy. For it is plain that, in the illustration given above, the associative process might occur without any reference to "contiguity in time," which some psychologists consider to be the basis of all association. For the idea of militarism and autocracy naturally sets the thinking man to ask whether there is any relation between militarism and the opposite of autocracy—viz. democracy. Here is association of a very different order from that of a colour and a sound: yet it is, at bottom, the same process. The reader will ponder for himself upon the truth of Bain's theory that our intellectual processes are essentially associative; and that the measure and quality of the associations

give the measure and quality of the intellect. But the point which I would insist here is that our knowledge of sensory and motor areas, our recognition of association tracts, and our metaphor of the bell and the wire—these, which indeed seemed adequate to explain the association of relatively simple "sensory images" such as those of colour and sound, are ludicrously inadequate to explain the association of what we more commonly mean by ideas — complex intellectual propositions such as I have quoted. It is not proposed, by any means, to essay an explanation of rational or associative processes in neural or physical terms: my purpose is rather to show how inadequate and primitive our knowledge of physiological psychology is seen to be, when we attempt to correlate it with our observation of the higher intellectual operations.

But there is an aspect of association which is well worthy of more attention than it has hitherto received in text-books of psychology, and that is what the student of the mind diseased understands by the association of sensations. As I am loth to complete this little book without any allusion to the help which the study of insanity affords to modern psychology, I propose to devote a brief chapter to this subject which, I think, should never be entirely ignored in treating of the association of ideas, as that phrase is usually understood.

CHAPTER VIII

THE ASSOCIATION OF SENSATIONS

By the "association of sensations" the psychologist indicates the well-established phenomenon that certain sounds, for instance, arouse, in many persons, what is most loosely termed a "subjective sensation" of light. This phenomenon must be distinguished from the (undoubtedly allied) power of a scent or a tune to evoke certain memories, *i.e.* from "normal" association of ideas. In cases of associated sensation, the sound of violins arouses, perhaps, an impression of crimson. This is the commonest type of associated sensation — the arousing of visual by auditory sensation—and, as far as I can discover, is by no means uncommon amongst musical people. Judging by my own lack of acquaintance with this phenomenon, I would tentatively suggest that it is more likely to occur in people who have a "feeling" both for music and for colour. Much rarer are the cases where colours evoke hallucinations of sound; but even rarer combinations are recorded, as of hallucinations of smell and of taste aroused by colour or sound, and even *vice versâ*. Many of the cases seem incredible; but it must certainly be accepted that the association of sensations is a fact and not merely a poetical figure of speech. Most frequently the association is inconstant; but there are cases in which it is invariably aroused. I am unable to say whether there is any constancy in the relation, *e.g.* whether

the violin arouses an impression of crimson, say, whenever it arouses any, or whether it arouses crimson in one case and purple in another, or different colour impressions in the same person at different times. If any reader has personal experience of associated sensation or has knowledge of it from trustworthy friends, he will serve me by sending me *data* of such cases. Accurate observations on this subject are very hard to obtain in any numbers sufficient for generalisation.

Certain tentative generalisations may, however, be based upon the few *data* at my disposal. In the first place it may be noted—confining ourselves to the sound-colour association—that it is usually observed, as might be expected, in those who are especially sensitive to and appreciative of such stimuli. It is from "musical" people that one expects to hear accounts of this association. We know, for instance, that Wagner, the great master of "clang-tint," had a most intense love of colour; and it is very probable that auditory sensations aroused visual hallucinations in him, and *vice versâ*. So far, the inference is in favour of associated sensation as a privilege of those in whom the senses are highly developed.

But my use of the word hallucination—for such aroused sensations are plainly hallucinations—will prepare the reader to believe that the most striking instances of associated sensations are furnished by the records of the alienists. It is amongst the insane or mentally unstable that we find, as a rule, those cases where the association is invariable and obtrusive, whereas in the cases one meets amongst

one's friends it is occasional, and the aroused sensation is usually very faint. In cases recalled by the alienist, the subject is sometimes almost uncertain which is the aroused and which the arousing sensation. From these considerations, then, the inference would be that association of sensations is morbid, or at any rate, abnormal. Here, it is plain, we impinge upon the question as to the relation between insanity, with the states of exalted sensation met therein, and genius, which also is distinguished, in its æsthetic forms, as in certain poets and musicians, by a heightening of the sensory faculties. Plainly we cannot declare, off-hand, that the association of sensations is "good" or "bad."

Needless to say, we cannot omit the evolutionary idea in considering this question. If it be true that all the senses have a common origin, we may be inclined to think that the evoking of colour-sensation by a trombone is a reversion—evidence of the incompleteness of that "segregation" and "integration" which evolution should establish. It may be said—and he who has never experienced an associated sensation is naturally inclined to this opinion—that one ought not to confuse one sense with another, that so to do is to revert to the more primitive stage in which the senses were yet undifferentiated. This contention must further be criticised; but ere I do so, it is necessary to note an allied phenomenon, the relation of which to "associated sensation" proper offers a problem of too much subtlety to be now discussed. This, by way of emphasising the distinction, we may call the *confusion of sensations.*

In "associated sensation," as we have seen, one sensation due to an "objective stimulus" arouses another which we have termed an hallucination. You hear the violin and see crimson: the violin is there, but the source of crimson light is not. This, as I think, must be distinguished from the cases where the subject more or less definitely apprehends one external object by two senses. In Shelley's "Ode to a Skylark," for instance, we have the poet saying of the moon: "We hardly see, we feel that it is there": and I could name certain chords, notably from Wagner's third period, which give me the impression of being *palpable* as well as audible; I *hear* and (very faintly) *feel* that they are there. Such semi-palpable chords are, in my case, uncommon and complex. Instances are the chord that opens the descending phrase at the climax of Isolde's "Liebestod," and also the wonderful resolution at the word "kuss" in Schubert's setting of Marguerite's lament at the spinning-wheel. This phenomenon, which is doubtless not unknown to others, I myself attribute to a sort of sensory reversion: hearing and touch are both pressure senses, and when encountering a rare sound-complex my hearing and tactile sense apparently revert to their original fusion or undifferentiation.

Now let us return to the question whether we are to interpret the evidence of the asylums as indicating that true association of sensations—as distinguished from the confusion of sensations—is a retrogression and not an advance. In tentatively inclining to affirm that the evidence must not be so interpreted, and that, so long as the subject is

not actually deluded, the association of sensations is a gift and not an infirmity, I would plead the admittedly dangerous argument from analogy. Evolution implies integration and segregation, but it also implies increasing interrelation between its products. Evolution means more than mere *dispersion:* the more various and distinct its products, the more certainly must they be correlated; else we have chaos and not cosmos. In the realm of mental action we find this interrelation expressed as what we call the association of ideas—which is by no means the confusion of ideas. The characteristic of the intellectual forms of genius—such as mathematical genius—is the freedom, the variety, the completeness, the balance, the daring of the association of ideas. The analogical argument, then, is that associated sensation—not confused sensation, as when I half-feel a Wagnerian chord—may bear to the æsthetic forms of genius some relation more or less parallel to that which the association of ideas bears to philosophic genius. In your Newton one idea suggests another—his mind leaps from a falling apple to a falling moon; in your poet of sense, as Keats, a rare visual sensation suggests an auditory image; in your Wagner, a rare chord a blaze of colour, and so forth.

In described cases of associated sensation the aroused sensation is actually *felt:* whereas in the man who thinks of a sunset when he hears Chopin, there is no delusion that he is *seeing* the sunset. I admit the distinction; but is not the process essentially the same, though the aroused image is vivid in the one case and faint in the other?

On these grounds, notably in remembrance of the characteristic so noteworthy in the poets — the describing of the experience of one sense in terms of another—I am inclined to regard association of sensations, provided that the discrimination of the subject is preserved—provided that, to use terms precisely, the hallucination does not become a delusion — as a gift rather than an infirmity. But I very much doubt whether the majority of alienists would be inclined to endorse this opinion.

CHAPTER IX

THE ORIGIN OF OUR IDEAS

More than two hundred years ago, John Locke, the father of modern psychology, wrote the great "Essay" in which he destroyed, beyond remedy, the doctrine of *innate ideas*. He showed that we have no such ideas, neither of God, nor duty, nor time, nor space, nor aught else. The reader will not be confused by this assertion that, for instance, we have no innate idea of duty, even though he remembers the existence of the maternal instinct in the bird or the mammalian mother. It is plain that such a mother does not act under the influence of an intellectual concept, such as is expressed by the word duty. It is with the origin of such concepts that we are now concerned.

The teaching of Locke on this matter may be expressed thus: *Nothing is in the mind that was not first in the senses.* Locke declared that all our ideas,

without exception, are derived from sensation and reflection on past sensations; in other words, all our ideas are derived from individual experience; or, in the evolutionary terminology, by the converse of the individual with the environment.

The next chapter in the history of this great controversy is furnished by the celebrated criticism of Leibnitz—the German courtier, mathematician, and philosopher—who added three significant words, *nisi intellectus ipse*—to Locke's dictum: which then read—Nothing is in the mind that was not first in the senses, *except the mind itself.* In this form, of course, the proposition is more striking than philosophic; but the paradoxical addition of Leibnitz was of great significance.

For the question was next attacked by Immanuel Kant, who gave a very real meaning to the little phrase which Leibnitz had added to the dictum of Locke. Kant was prepared to distinguish between the *forms* of the mind and its ideas or intellectual *contents.* These last, he agreed with Locke, are none of them innate; they are all derived, as Locke taught, from sensation and reflection thereupon; *but* the mind itself, before all experience, said Kant, is possessed of certain inherent FORMS, in virtue of which it sees or conceives all things, for instance, in terms of *time* and *space.* These forms of the mind are incapable of analysis; they precede all experience; they are not ideas or contents of the mind, but the mode under which it conceives its ideas or "arranges" its contents; and their recognition justifies the addendum of Leibnitz, "except the mind itself."

But, indeed, though I should have to admit, if it mattered to any one, that this teaching, authoritatively imparted, once satisfied me—indeed, it will not do.

For, in the first place, Kant's contention that our apprehensions of time and space are not ideas at all, but forms of the mind, is quite untenable. It is impossible to maintain that we are not speaking correctly when we speak of the idea of time. We have an idea of time and an idea of space, just as we have an idea of matter; and it is quite certain that these ideas, so far from being unalterable and inherent forms of the mind, vary widely in the minds of the philosopher and the man in the street; in the minds of different philosophers, or of the same philosopher at different times.

But not only is the doctrine that these are not ideas untenable: there is as little justification for the assertion that they are prior to all experience. Modern psychology, within, say, the last three decades, has accomplished what was declared to be impossible; it has analysed these ideas and demonstrated their genesis in experience.

For instance, it has been conclusively shown that our idea of space is gradually built up from the sensations which we derive from our skin, our muscles, our joints, and the six semicircular canals—the organs of equilibration which lie three on each side of the head, in close relation to the internal ear. The doctrine that our idea of space is not an idea but a form of thought or form of the mind, and the doctrine that it is anterior to experience, has been completely exploded

by modern physiological psychology. Some of us may suspect that the magnificent mind of Kant, could it revisit the glimpses of the moon, would be the first to accept and point out the significance of these recent inquiries, against the few remaining Kantians who think that psychology has stood still since 1804.[1]

Yet again, modern psychology cannot accept the assumption of Kant that our concepts of time and space are parallel or analogous, or "on all fours." On the contrary, we have reason to believe that whilst our concept of space does indeed correspond to a fact of the external world, our concept of time is merely a convenient "short-hand" expression of our consciousness of *change*. Some say that it is merely a manner of expressing our consciousness of change within us, our consciousness of a sequence in our states of consciousness. Others say that our concept of time is derived from our experience of change in the external world. But perhaps this controversy is hardly worth pursuing, since our consciousness of change within ourselves must ultimately be referred, by those of us who believe in the existence of an external world at all, to our consciousness of change therein.

But if we reject, as we must, the contention of Kant, are we to accept the original contention of Locke, that the mind is a sheet of blank paper, or, as he said, a *tabula rasa*, a smooth surface, on which

[1] In this and a thousand other matters people are inclined to say, "Who in the world are *you*, to criticise such a man as Kant?" To which the answer is that we little folk can see further than he, because we are standing on his shoulders.

experience records what it will, and which (by the hypothesis) must be practically identical in all of us—since one sheet of blank paper can differ from another only in area and in impressibility? No; this would be impossible, we say at once. Whereupon it is retorted that we must then admit the doctrine of ideas or forms of the mind which are prior to experience.

But here there intervenes Herbert Spencer with a solution which has gained perhaps more admiration and wider recognition than any other of his ideas. Certainly, says Spencer, we have neither ideas nor "forms of the mind" (assuming for the sake of argument the propriety of this distinction) that are independent of the individual experience; but nevertheless the mind is not a *tabula rasa;* each mind has a character of its own, has a series of "inherited mental predispositions," and these are the product of racial or ancestral experience. In other words, we have mental tendencies or potentialities which need but the touch of experience to express themselves in ideas or forms of thought which are thus practically innate or *à priori* for the individual, but are *à posteriori* in the race.

This solution of Spencer's is, as I have hinted, almost universally or quite universally accepted. We find it recognised even by the academic psychologists, who hold it as the first article of their *credo* that every assertion of Spencer's may safely be assumed to be wrong. The solution could not be more satisfactory; it combines the truths expressed by both sides; it explains innumerable facts; and it

is contradicted by none. In its recognition of inheritance as a matter of potentialities or tendencies, it is entirely in accord with the modern conception of heredity. But, says the reader of an earlier volume, what about Weismann?

Plainly this doctrine of Spencer's implies the inheritance of acquired characters: the individual undergoes certain experiences which modify his nervous organisation, and these modifications are transmitted to his descendants. But Weismann denies the possibility of this. If now we consult the "Principles of Heredity," lately published by my friend Mr. Archdall Reid, wherein he advocates most strenuously the doctrine of Weismann, and many chapters of which are devoted to psychology, we find no discussion whatever of this irreconcilable issue between Weismann and the psychologists of to-day, who accept without reserve the doctrine of the inheritance of acquired nervous characters. In the absence of any defence of their master's dogma in this relation, on the part of his two leading champions in England, Professor Arthur Thompson and Mr. Archdall Reid, we may perhaps conclude that they are disinclined to attack a doctrine so admirably consonant with the facts as Spencer's teaching that any generation profits directly, through heredity, by the experience of its predecessors. Of course this idea of Spencer's does not lend itself to experimental verification; but its probability must count for something against Weismann's theory that acquired characters are not transmissible.

At the same time we must recognise, in our effort

to consider the whole matter impartially, that the case in point may well be cited by the Weismannians in support of their contention that the mechanism by which acquired characters might be transmitted is absolutely inconceivable. Indeed it is scarcely possible plausibly to conceive any mechanism by which the experience of a father, affecting his nervous organisation, can so alter his germ-plasm as to cause it to give rise to a new nervous organisation in which are reproduced the modification produced in the father's by his experience. Perhaps, then, we shall be most fully in consonance with the true spirit of science if we admit that we are here face to face with one of the problems which must yet be written down as unsolved.

CHAPTER X

PSYCHICAL RESEARCH

THAT the records of so-called psychical research abound in fraud and credulity and wild speculation and unproved assertions of all kinds no one will deny—certainly not the most serious students of this branch of knowledge. So abundant and manifold are these regrettable features that most of us have been tempted, at one time or another, to set down the whole business as vain, unprofitable, and vacuous. This attitude, however, cannot long be maintained, even though we constantly hear of triumphs of psychical research which are obviously fictitious. For every now and again we read of

cases of curious happenings which may indeed be susceptible of more than one interpretation, but which obviously do contain matter which the whole-hearted student of psychology cannot possibly afford to ignore; and therefore I propose to devote a final chapter to psychical research as earnest of my belief that this is a branch of study which has already served the truth, and which is now being conducted, by not a few, in a spirit which is certain of its reward. Many subjects suggest themselves for treatment, but rather than deal perfunctorily with many, I propose to deal very fully with one which has most claims to recognition by those who are not professed students of psychical research.[1]

The student of physiology and its offshoot, experimental psychology, cannot flatter himself that he is doing his duty to science if he declines to examine the alleged phenomena of telepathy, for if their existence can be demonstrated they intimately concern him; and, in any case, there are certain undisputed facts in his department of study which are more than relevant to this controversy.

The connotation of the word telepathy is confined, in the present chapter, to the transference, in the simplest circumstances, unconnected with death or other great happenings, of the very simplest kind of ideas. As a type experiment,

[1] The greater part of the following pages has already appeared in an article called "A Criticism of Telepathy" which appeared in the *Occult Review* for April 1905. The printing of so sceptical an article on a phenomenon which the editor and most of the readers of that journal regard as proved, may be taken as an index of their desire to ascertain the truth by the most rigorous methods.

I take one which is much employed by the Society for Psychical Research. The two students sit at some distance apart, in the same or adjacent rooms. One turns up a shuffled heap of playing cards, or cards on which numbers are written. He gazes at the cards in silence, and the second worker attempts to receive the required information from him, and to note it down. The experiment is obviously simple, and the results are capable of very rigorous analysis.

Now the point of view of the average sceptic—such as myself—is this. He desires to form in thought a coherent idea, a rational concept, of the process involved. As we see it, the process must consist of the discharge of some form of energy from the transmitter's brain, the passage of that energy—doubtless a species of motion—through some material or ethereal medium (since we decline to believe in "action at a distance"), and finally the reception and interpretation of this form of energy by the recipient's brain. If so much be admitted, let us look at the possibilities.

And, first, as to the reception of the message by the second experimenter. In all instances of sensation hitherto recognised, the action of a sensory end organ and its afferent or centripetal nerves is to be observed. There are end organs for all the senses, touch not excluded. Now it is probably maintained by no one that the telepathic message is felt, seen, heard, smelt, or tasted; but rather that it is directly received by the percipient brain. If so, the case is unique. As far as we are able to ascertain, the brain is entirely insensitive to all *direct* impressions.

If the optic nerve, for instance, be stimulated, the optic centres, in the occipital or hind lobes of the cerebrum, create a sensation of light; but if light be directly flashed upon the exposed occipital lobes, no vision results. Similarly, if the end organs or sensory nerves of touch be stimulated, sensation results, but if the brain, even in the tactile centres, be touched, handled, or pricked, no pain is felt, no sensation of touch is produced. If, then, telepathy be a fact, we have in it a unique instance of direct appreciation of external stimuli by the cerebrum.

Secondly, as to the conveying medium between the two brains. This can hardly be anything other than the ether; it cannot possibly be the air. Now he would certainly be a bold man who should declare that the ether does not vibrate in any ways hitherto unknown to man. Even if we confine ourselves to the regular transverse vibrations which, when occurring at certain frequencies, constitute the objective basis of light, we know well that only a few octaves in a series of vibrations which need have no limit have yet been mapped out. To this series belong the rays of ordinary light, the Röntgen rays, the Becquerel rays, the Lenard rays, the waves of radiant heat, those employed in wireless telegraphy, and many more. We may then inquire which, if any, of these are actually generated externally by a living and conscious human brain. As far as is known, it is only the heat rays, of those above-mentioned, that are so generated, and though these vary in amount at different times, the variation is probably due not to any changes in con-

sciousness, but to the differences in the amount of blood that happens to be present within the cranium.

But M. Blondlot, of the University of Nancy, announced about a year ago, after a research extending over three years, his discovery of a new type of radiation, which he calls the N-ray, in honour of the place of its discovery. The reader is doubtless aware that though the Paris Academy of Sciences has awarded M. Blondlot its prize of 50,000 francs for the most important discovery of the year in physical science, yet there is still much dispute as to whether there is any objective fact which corresponds to these rays. The editor of the *Revue Scientifique* instituted an *enquête*, recently concluded, into this subject, and has collected the opinions of all the leading physicists. It is, of course, not possible to decide this or any other scientific question by means of a plebiscite; but, at any rate, this inquiry has revealed the existence of much opinion of the highest weight in favour of M. Blondlot; and we are entitled to discuss the bearing of the N-rays on the question of telepathy, even though the controversy is not yet ended.

M. Charpentier, a colleague of M. Blondlot, holds the chair of physiology at Nancy, and has lately devoted his very expert powers to the study of the N-rays, which, according to him, are emitted from the human body, and especially from nervous tissue. It is believed that the nature and intensity of the radiation varies with the activity of the nerves under experiment, and, further, that the same is true of the brain. The radiation, which is asserted

to pass outwards through the skull from the cerebral hemispheres, is said to vary in different parts according to their activity—as, for instance, over the speech centre when the subject is talking. Practically M. Charpentier believes that he has seen himself think; and it certainly does look as if the N-rays might be the medium of thought transference, assuming such transference to occur. It is to be hoped that experiment will shortly be made upon the sensitiveness of the brain to N-rays impinging upon it; for if any such sensitiveness (despite what I have said regarding the insensitiveness of the brain to direct stimulation) could be discovered, the possibility of thought transference would practically be established.

But I especially desire to offer some criticism of the evidence for telepathy collected by the Society for Psychical Research. By the courtesy of Sir Oliver Lodge, then President of the Society, I was permitted to examine at my leisure the records of the very numerous experiments which have been made at the Society's rooms during the past few years. As every one knows, this evidence is regarded by Sir Oliver Lodge as having established the occurrence of telepathy as a proven scientific fact. No objector need cavil at the simplicity of the circumstances, or protest that the conditions were made as easy as possible. No matter how the process was facilitated, if the fact can be demonstrated that transference of ideas in this fashion can occur *at all*, we shall have embarked upon a voyage of new discovery fraught with the gravest interests for science and humanity.

It must not be thought that the results of the Society's experiments are unequivocal. The rather do they demonstrate that, if thought transference be possible at all, it is an exceedingly untrustworthy process. The results are such that we are necessarily embarked upon a somewhat recondite statistical inquiry. And here I wish to raise what seems to me a point of the first importance.

The common remark that "you can prove anything by statistics" ignores the fact that, consciously or otherwise, we use the statistical method in nearly all matters of inquiry. This is obvious on a moment's consideration. But there has recently been developed a scientific school of criticism which concerns itself with the rigorous analysis and interpretation of crude statistics. Of this school Professor Karl Pearson is the most distinguished representative in this country. His services have already been employed by the medical profession in analysis of the statistics bearing upon inoculation for typhoid fever; and exceedingly valuable those services have been. In relation to the question now under discussion, I suppose Professor Pearson would be suspected of *parti pris;* but I would earnestly suggest that all the records of experiments conducted by the Society for Psychical Research be submitted to some trained critic of statistics. Till that is done, we cannot accept Sir Oliver Lodge's opinion that the fact of telepathy is "scientifically proved." Sooner or later, indeed, this must be done; for we shall learn that statistics not so criticised cannot be accepted, whatever the subject to which they relate. In any case, nothing but

good can come of such an inquiry, which is bound to serve the cause of truth. The trained critic may return an unequivocal answer, that telepathy is a proven fact; or he may demand more experiments of the same kind; or may suggest new ones: but, whatever his verdict, the Society should not—and, I am sure, will not—be afraid to face it; for we all desire only to follow Truth wherever she leads.

In so far as I am a judge of myself, I believe that my mind is open on this subject; but I cannot bring myself to understand such a sentence as the following, taken from Sir Oliver Lodge's paper in Part II. of Vol. II. of the Society's *Proceedings*: "In proceeding to the details of the actual experiments, it would take far too long to recount the whole—failures as well as successes; I shall only describe a few from which a more or less obvious moral may be drawn." It seems to me that from a selected few *no* moral may be drawn.

I sincerely hope that these records may be submitted to the criticism of an impartial and trained mathematician. The matter is too important to be left where it stands. And if it should appear that the Society has proved telepathy to be a fact, and if the discovery of the N-rays should be confirmed and correlated with the Society's work, psychology will have made one of the most striking and important advances in its history.

Of course I am fully aware that the argument for telepathy is far from resting entirely upon these experiments. My discussion of them is justified, as I think, by the importance which has been attached

to them by some. But even if these experiments were regarded as inconclusive or nugatory, the case for telepathy would by no means be disproved, especially in view of the *à priori* arguments I have advanced in its favour. It may fairly be argued, for instance, that the power of thought transference is not under the control of the will. To this proposition the student of modern psychology, whatever his attitude towards psychical research, is bound to assent, for he regards almost all volitioning as related to muscular action, and his knowledge of anatomy teaches him that any apparatus adapted for the willing of thought transference is, as far as we can discover, entirely lacking. It may further most properly be argued that the telepathic act can only occur in mental conditions somewhat different from those of every day—such as those of the experimenters whose work has been referred to. If it should appear that the statistical method is inapplicable, yet it is by no means therefore demonstrated that telepathy cannot be conclusively proved to be a fact, in virtue of individual instances well attested and totally exclusive of the operation of chance, as very many of them certainly appear to be. Only I would suggest to those who believe in telepathy that they must rest their case on the most varied and indisputable evidence obtainable. The most certain conclusion in the world can only be prejudiced by its foundation upon doubtful *data*.

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Printed by BALLANTYNE, HANSON & Co.
Edinburgh & London